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ABSTRACT

This 36-46 hour basic respiratory care course has been designed to enhance the skills of health professionals in providing limited respiratory care during those hours when a respiratory care practitioner is not available. Persons taking the course are assumed to have a basic knowledge of anatomy and physiology, administration of medications, and health care procedures. The course contains seven units and is divided into five sections. The first section deals with the role of the limited practice respiratory care giver; patient conditions requiring technical respiratory care; methods for assessing patients; and determining which health professional should provide the care. Section 2 reviews the legal and ethical responsibilities of health professionals who provide respiratory care. Section 3 recalls basic concepts related to respiratory care, including anatomy and physiology, acid-base knowledge; and respiratory pharmacology. Section 4 provides knowledge and skills needed to carry out limited respiratory care procedures; Section 5 deals with using community resources to provide discharge planning. Included in the course is a competency list; teaching outlines for each unit, relating objectives, content, and teaching methods; skills checklists for student evaluation; and eight references. (KC)

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LIMITED PRACTICE RESPIRATORY CARE COURSE

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Foreword

A State committee was used to determine the need and content of this course. We would like to give special thanks to the following persons who provided this essential technical assist committee.

Committee to Develop Course:

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LIMITED PRACTICE RESPIRATORY CARE COURSE

Course Description - This 36-46 hour basic respiratory care course has been designed to supplement the skills of health professionals to provide limited respiratory care during those hours when a respiratory care practitioner is not available. It is assumed persons taking the course have a basic knowledge in normal anatomy and physiology, administration of medications and patient care procedures. The course is divided into five basic sections:

Section one deals with the role of the limited practice respiratory care giver; patient conditions requiring technical respiratory care, methods for assessing the patient and determining the health professional required to provide the care.

Section two reviews the legal and ethical responsibilities of health professionals who provide respiratory care.

Section three recalls basic concepts related to respiratory care; including anatomy and physiology, indepth acid-base knowledge and respiratory pharmacology.

Section four provides knowledge and skills to provide limited respiratory care procedures. These procedures include assessment, providing O₂ therapy, incentive spirometry, sputum induction, postural drainage, nebulizers, specific medication treatments, inhalers, initiating and maintaining airways, providing tracheostomy care and CPR.

Section five deals with using community resources to provide discharge planning.

Course Content and Recommended Times:

Following is an overview of the course content and suggested teaching times for each unit. Since this is a new course, the time frames are given in the form of ranges. The course length should be determined by the teacher and the health coordinator prior to offering the course. After the course has been piloted a specific time frame will be used for consistency and to fairly award C.E. for licensed nurses.

There are seven units in the course. Following are the time frames suggested by the advisory committee.

Unit 1 - Role of the "Limited" Respiratory Practitioner including legal aspects	2 - 3 hours
Unit 2 - Anatomy review pharmacology, and laboratory tests of respiratory functioning	8 - 12 hours
Unit 3 - Patient Assessment	3 - 4 hours
Unit 4 - Oxygen Therapy	6 - 8 hours
Unit 5 - Review of Basic Respiratory Care Treatment	12 hrs. (6 of these Hrs in Lab.)
Unit 6 - Use of Airways in Caring for Respiratory Patients	4 - 6 hours
Unit 7 - Community resources/referrals etc.	1 hour

TOTAL RECOMMENDED TEACHING TIME RANGE 36 - 46 hours

Method for Teaching the Course

This course is designed to increase the knowledge and skills of the licensed nurse. Lecture, discussion, models, and charts are used to assist in the review and introduction of new skills. Class, laboratory, clinical experiences will be used to broaden this base. Laboratory consists of both demonstrations and return demonstrations. Clinical applications will be made at each participants place of employment; participants will be asked to share these experiences with other class members.

Course Participants

This course has been developed for registered nurses and licensed practical nurses who are required to provide "limited respiratory care" for patients when a respiratory care practitioner is not available. C.E.U.'s for renewal of nursing licensure should be given upon successful completion of the course.

Course Teachers:

Course teachers should be respiratory care practitioner with knowledge and experience in the areas covered. CPR instructors must be certified by Red Cross or Heart Association.

Materials and Texts:

The approved course curriculum will be given to each student. Supplemental materials will be made available. It is up to each instructor to determine the need and selection of a course text.

Evaluation

Students will be given quizzes, unit tests and must satisfactorily demonstrate skills on the skill checklists provided. Once students have successfully completed the course they will receive a certificate verifying successful completion from the area college. If the student is a licensed nurse they will also receive C.E.U's for renewal of nursing licensure.

Competency List

- I. Describe role of health care practitioner who provides limited respiratory therapy in patient care settings.
 - A. State purpose (goals) of limited respiratory therapy care in a patient care setting.
 - B. Identify criteria for seeking consultation/assessment from respiratory care professional.
 - C. Describe the role of the limited respiratory care provider.
 - D. Identify state and other accrediting agencies that have an impact on respiratory care in the patient care setting.
- II. Interpret legal/ethical requirements for providing respiratory care.
 - A. Identify the rules/regulations/policies/procedures developed by the facility.
 - B. Describe the characteristics of a good working relationship with patients and other health care providers.
 - C. Identify legal responsibilities of limited respiratory care provider.
 - D. Identify ethical behavior while performing limited respiratory therapy.
- III. Recall concepts related to respiratory care and:
 - A. Cardio respiratory anatomy.
 - B. Respiratory care pharmacology.
 - C. Acid-Base Knowledge.
- IV. Demonstrate the ability to provide limited respiratory care on an inpatient/outpatient basis.
 - A. Identify through appropriate patient assessment the clinical needs of each patient on an individual basis. This will be accomplished by:
 - 1. Chart review
 - 2. Gross assessment
 - 3. Pulmonary assessment
 - a. Cough effectiveness/sputum classification
 - b. Auscultation
 - 1) Appropriate classification of breath sounds
 - c. Bedside spirometry
 - d. ABG analysis/Hypoxia evaluation
 - 4. Laboratory Data

B. Identify through appropriate patient assessment the clinical needs of oxygen therapy with application to specific disease entities following criteria established by RCP. Be familiar with and/or demonstrate the use of:

1. Low flow O₂ Therapy
 - a. Cannula
 - b. Simple mask
 - c. Partial rebreather/nonrebreather
2. High flow O₂ Therapy
 - a. Vent-mask
 - b. Aerosol generator
 - 1) Application to various masks, t-pieces, etc.
3. Calibration of O₂ Analyzers/O₂ Analysis
 - a. Principles of O₂ Therapy. Analysis understood
4. O₂ Supply Systems
 - a. O₂ Therapy safety precautions
 - b. Familiarity with tanks/regulators E and below
 - c. Familiarity with tanks/regulators E and above
 - d. Tank calculations for duration of flow
 - e. O₂ Home Systems
 - 1) Concentrators
 - 2) Liquid systems
5. Be familiar with and/or demonstrate the use of Pulse Oximetry in evaluation of clinical hypoxia

C. Using information provided by Respiratory Therapy Department, identify through appropriate clinical assessment the needs of pulmonary hygiene/respiratory care treatments. Be familiar with and/or demonstrate the use of:

1. Medications
 - a. Basic classifications and actions of respiratory therapy drugs
 - b. Dosages recommended
 - c. Dosage calculations
 - d. Medications applicable to specific disease processes
 - e. Contraindications
 - f. Adverse effects
2. Hand-Held Nebulization Therapy
3. Metered Dose Inhaler
4. Chest Physio Therapy/Postural Drainage
5. Incentive Spirometry
6. Ultrasonic Nebulizer Therapy
7. Sputum Induction Therapy

D. Using information provided by Respiratory Therapy Department, identify through appropriate clinical assessment the need for airway maintenance. Be familiar with and/or demonstrate the use of:

1. Identify the appropriate airways needed for specific patient requirements
2. Demonstrate competency in the procedure of suctioning
 - a. Oropharyngeal
 - b. Endotracheal
 - c. Tracheostomy

- 3. Familiarity/competence in the use of resuscitation equipment.
- E. Achieve CPR certification and recertification.
- F. Evaluate and document the effectiveness of all modes of respiratory therapy provided.
- V. Utilize community resources in planning respiratory care for the patient through:
 - A. Discharge planning
 - B. Resource/Referrals

3/30/90

Limited Respiratory Care

Unit I. This unit explores the role of the health practitioner who provides basic respiratory care and the legal/ethical issues associated with providing respiratory care.

Time: 2-3 hours

OBJECTIVE	CONTENT	METHOD
1.0 List the goals of respiratory therapy care.	I. Respiratory therapy care A. Goals 1. Assess respiratory status 2. Maintain airway 3. Improve status through prescribed treatments 4. Evaluate outcome of treatments	Lecture/discussion Course handout
1.1 Discuss respiratory conditions requiring specific care by describing pathophysiology of the condition, listing symptoms and common respiratory treatment regimes.	B. Patient conditions requiring specific care 1. Normal anatomy and physiology a. Structures b. Physiologic phases of respiration c. Requirements of ventilation d. Factors influencing gas exchange 2. Common conditions - diagnosis a. Allergic conditions b. Neoplasms c. Traumatic conditions d. Chronic conditions e. Acid/base imbalances 3. Treatments a. Medications/O ₂ delivery b. Pre and post-op respiratory care c. Airway maintenance d. CPR e. Ancillary treatments	Lecture/discussion Diagrams
1.2 Describe the role of the health practitioner who provides basic respiratory care. 1.2.1 List basic services that can be performed.	C. Role of limited practice 1. Provide services when there is no respiratory care practitioner available 2. Services include a. Patient pulmonary assessment b. Oxygen therapy 1) High flow therapy 2) Low flow therapy	Lecture/discussion Handout course objectives Checklist handouts

Limited Respiratory Care

Unit I. This unit explores the role of the health practitioner who provides basic respiratory care and the legal/ethical issues associated with providing respiratory care.

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OBJECTIVE	CONTENT	METHOD
	3) Calibration of O ₂ analyzers 4) O ₂ analysis 5) Provide through O ₂ supply systems c. Administer respiratory medications via adjunct equipment (HHN, MDI, USN) d. Postural drainage e. Incentive spirometry f. Sputum induction g. Maintain airways 1) Suction 2) Perform CPR h. Evaluate effect of treatment 3. Discharge planning - teaching patient D. Course for preparation E. Seeking assistance 1. Situations requiring respiratory assessment and planning a. Mechanical ventilation b. Ongoing evaluation 2. Sudden significant respiratory changes 3. Poor response 4. Other F. State agencies	
1.2.2 Describe patient conditions that require the services of a respiratory care practitioner or designated staff.		
1.3 List state agencies that influence type of respiratory care services that can be provided by non-credentialed individuals.	1. State advisory committee for respiratory care a. Rules and regulations b. Credentialling personnel c. Scope of practice 2. Iowa Board of Nursing a. Nursing practice b. Scope of practice 3. Board of Medical Examiners 4. Iowa Board of Nursing	Lecture/discussion Handout on rules and regulations

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Limited Respiratory Care

Unit I. This unit explores the role of the health practitioner who provides basic respiratory care and the legal/ethical issues associated with providing respiratory care.

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OBJECTIVE	CONTENT	METHOD
1.4 Interpret legal/ethical requirements for providing respiratory care.	II. Legal/ethical A. Scope of practice 1. Respiratory therapy practice 2. Licensed health professional scope	Lecture/discussion Handout
1.5 Review legal responsibilities and provide instances that apply to respiratory care.	B. Legal responsibilities 1. Assault/battery 2. Informed consent 3. Confidentiality 4. Malpractice 5. Negligence 6. Reasonable care	Lecture/discussion
1.6 Review ethical considerations when providing respiratory care.	C. Ethical considerations 1. Special needs of patient who has respiratory problems a. Anxiety/fear b. Long term processes 2. Communications (verbal and nonverbal) a. With patient b. With other professionals 3. Support for patient/family 4. Patient's bill of rights as applicable to respiratory care 5. Respect of individuals D. Death and dying 1. Support of patient 2. Support of family	Handout

Limited Respiratory Care

Abbreviations

ABG	Arterial Blood Gas
AFB	Acid Fast Bacillus
CXR	Chest X-Ray
CPT/PD	Chest Physio Therapy/Postural Drainage
F _I O ₂	Fraction Inspired Oxygen
HHN	Hand Held Nebulizer
IS	Incentive Spirometry
L/m	Liters per minute
MDI	Metered Dose Inhaler
O ₂	Oxygen
RCP	Registered Care Practitioner
RR	Respiratory Rate
USN	Ultrasonic Nebulizer

Limited Respiratory Care

Unit II. Recall concepts related to respiratory care: cardio-respiratory anatomy, respiratory care pharmacology, and acid-base balance.

Time: 8-12 hours

OBJECTIVE	CONTENT	METHOD
2.0 Recall concepts related to cardio-respiratory anatomy.	I. Respiratory anatomy	Lecture/discussion
2.1 Review respiratory anatomy.	A. Upper airway	Transparencies/models of anatomical structures
	1. Nose/mouth	
	a. Humidity	
	b. Heat	
	c. Filter	Primary Function
	2. Pharynx	
	a. Located behind oral and nasal cavities	
	1) Nasopharynx	
	2) Oropharynx	
	3) Laryngopharynx	
	B. Larynx	
	1. Connects upper and lower airways	
	2. Glottis - opening	
	3. Cartilages	
	4. Mucosa	Lecture/discussion
	a. No cilia present	Transparencies/models
	5. Epiglottis	
	a. Covers glottis opening during swallowing	
2.1.1 Describe laryngeal function.	6. Laryngeal Function	Lecture/discussion
	a. Gas-conducting channel between upper and lower airways	
	b. Protect lower airway from foreign substances	
	c. Participate in cough mechanism	
	d. Participate in speech	
2.1.2 List the functions of the mucus blanket.	7. Mucus blanket	
	a. Function	
	1) Mucociliary escalator	
	2) Self-cleaning mechanism of normal lung	

Limited Respiratory Care

Unit II. Recall concepts related to respiratory care: cardio-respiratory anatomy, respiratory care pharmacology, and acid-base balance.

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OBJECTIVE	CONTENT	METHOD
	b. Cilia 1) Continuous movement toward larynx 2) Cleansing mechanism c. Sputum 1) Substance (mucus) 2) Mobilized by cough mechanism	
	C. Tracheo-bronchial Tree	
	1. Function	
	a. Conduct b. Humidify c. Heat	
	2. Respiratory Epithelium	
	a. Contains ciliated cells b. Produce mucus	
	3. Trachea	
	a. 10-12 cm in length b. C-shaped incomplete rings (cartilage)	
2.1.3. Review structure of bronchi.	4. Bronchi	Lecture/discussion Transparencies/models
	a. Mainstem bronchi	
	1) Angles of right and left mainstem bronchi with implications for aspiration, intubation, etc.	
	b. Carina	
	c. Lobar bronchi	
	d. Segmental bronchi	
	e. Subsegmental bronchi	
	f. Bronchioles	
	1) Clara cells - correlation with surfactant production	
	5. Mucus - cilia cell escalator	
2.1.4 Describe the function of lung parenchyma.	D. Lung Parenchyma	Lecture/discussion
	1. Function	
	a. Allow molecular gas exchange between blood and alveolar air b. Nutrient blood supply distal to this point via pulmonary-arterial system	

Limited Respiratory Care

Unit II. Recall concepts related to respiratory care: cardio-respiratory anatomy, respiratory care pharmacology, and acid-base balance.

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OBJECTIVE	CONTENT	METHOD
	2. Respiratory bronchioles a. Maximum gas exchange capability b. Each primary unit contains 2200 alveoli 3. Alveolar ducts 4. Alveolar sacs 5. Alveolar epithelium a. Macrophages b. Alveolar Type II cells 1) Surfactant 6. Lung interstitium	
2.1.5 Describe the structure of the thorax.	E. Thorax 1. Thoracic cage a. Sternum 1) Manubrium 2) Body 3) Xiphoid Process b. Ribs 1) 12 pair ribs 2) Intercostal vasculature c. Pleura 1) Visceral pleura 2) Parietal pleura 3) Pleural space d. Hilus e. Mediastinum	Lecture/discussion Transparencies/model
2.1.6 Describe the peripheral neuromuscular control of ventilation.	F. Muscles and nerves of ventilation 1. Diaphragm - phrenic nerve 2. Intercostal muscles - Intercostal nerves 3. Accessory muscles 4. Expiratory muscles	Lecture/discussion

Limited Respiratory Care

Unit II. Recall concepts related to respiratory care: cardio-respiratory anatomy, respiratory care pharmacology, and acid-base balance.

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OBJECTIVE	CONTENT	METHOD
2.2 Discuss the mechanism of respiration.	II. Respiration	
2.2.1 Define respiration.	A. Mechanics of respiration	Lecture/discussion
	1. Definition	
	a. Respiration - exchange of gases between a living organism and its environment	
2.2.2 Define pulmonary ventilation.	b. Pulmonary ventilation - process that moves air into and out of lungs	
2.2.3 Trace the respiratory cycle.	B. Respiratory cycle	Lecture/discussion
	1. Involves respiratory system, central nervous system, musculoskeletal system	
	2. Begins from midpoint or position of throat after a normal expiration; air pressure inside lungs is equal to atmospheric pressure	
2.2.4 Differentiate the process and physiology of inspiration from expiration.	3. Inspiration	Lecture/discussion
	a. Initiated by contraction of diaphragm and intercostal muscles	
	b. Flattening of diaphragm toward the abdomen with increase in vertical dimensions of the thoracic cavity	
	c. Elevation of ribs upward and outward to increase dimensions of the thoracic cavity	
	d. Elastic lung assumes contour change resulting in larger lung volumes	
	1) Same air volume in lung occupies a larger space	
	2) Air pressure in lung decreases rapidly	
	3) Air flows in through respiratory passage since pressure in airways is less than atmospheric pressure	

Limited Respiratory Care

Unit II. Recall concepts related to respiratory care: cardio-respiratory anatomy, respiratory care pharmacology, and acid-base balance.

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OBJECTIVE	CONTENT	METHOD
2.3 Review pulmonary circulation.	4. Expiration - Occurs as inspiratory muscles relax - Passive maneuver - Decreased thoracic volume and increased intra-thoracic pressure B. Pulmonary circulation - Cells take oxygen from arterial blood and return carbon dioxide to the venous blood - Venous system returns oxygen-poor, carbon dioxide-rich blood to right side of heart - Right ventricle pumps that blood into pulmonary artery - The artery bifurcates into left and right bronchus supplying respective lungs - Both branches split into smaller vessels and then into microscopic pulmonary capillaries that: - Spread over surfaces of air sacs where the blood picks up oxygen - Recombine into larger vessels forming the pulmonary veins - Pulmonary veins empty into left atrium and then into left ventricle where oxygen-rich blood is pumped and circulated through arterial system	Discussion of previous knowledge Diagram
2.3.1 Review the gas exchanges in the lungs.	C. Gas exchange in lungs Blood returning from body is low in oxygen and high in carbon dioxide	Discussion
2.3.2 State the principles for measuring O ₂ and CO ₂ .	- Measurement of O₂ and CO₂ - Partial pressure - amount of gas in a mixture	Lecture/discussion

Limited Respiratory Care

Unit II. Recall concepts related to respiratory care: cardio-respiratory anatomy, respiratory care pharmacology, and acid-base balance.

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OBJECTIVE	CONTENT	METHOD
2.3.3 Describe environmental O ₂ and CO ₂ concentrations.	b. Sum of all gases present must equal total gas pressure c. Any partial pressure of any one gas is a fractional concentration of total gas mixture d. Total gas pressure equals atmospheric pressure of 760 mmHg 1) Torr equals 1 mmHg 2) One atmosphere equals 14.7 lbs/square inch e. Concentrations 1) Room air equals 21% O₂ and 0.03% CO₂ 2) Breathing room air produces PO₂ (paO₂) of 140 torr and paCO₂ close to zero in alveoli 3) Venous blood from tissues contain PO₂ of 40 torr and PCO₂ of 46 torr 4) Room air contains 79% nitrogen a) No metabolic function b) Necessary for maintaining inflation of body cavities that are gas filled	
2.3.4 List the principles of diffusion.	3. Diffusion a. Gas diffuses from areas of higher partial pressure to areas of lower partial pressure b. Rate of gas diffusion across pulmonary membranes depends on solubility in water c. O₂ diffuses into blood plasma and combines with hemoglobin 1) Each gram of saturated hemoglobin carries 1.34 ml of O₂	Lecture/discussion Transparency

Limited Respiratory Care

Unit II. Recall concepts related to respiratory care: cardio-respiratory anatomy, respiratory care pharmacology, and acid-base balance.

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OBJECTIVE	CONTENT	METHOD
2.3.5 Identify how carbon dioxide is transported.	2) Hemoglobin is close to being fully saturated at PO_2 of 50-100 mmHg 3) Normal arterial PO_2 (sea level) is 80-100 mmHg 4. Carbon dioxide concentrations a. Carried as 1) 66% bicarbonate 2) 33% combines with hemoglobin 3) Small amount dissolved in plasma 4) Arterial PCO_2 35-40 torr	Lecture/discussion
2.4 Identify conditions that affect rate/type of respirations.	5. Regulation of respiration a. Voluntary control versus involuntary control 1) Action is mainly involuntary 2) Chemical, physical, and nervous reflexes monitor body oxygen needs b. Respiratory center located in brain stem (pneumotaxic center) 1) Nerve impulses sent to diaphragm and intercostal muscles 2) Inspiration initiated c. Stretch receptors located in lung and pleura stop inspiration d. Regulation by central and peripheral chemoreceptors 1) Central chemoreceptors a) Location (1) Medulla (midbrain) b) Function (1) Respond to increased pCO_2 and decreased PH (2) Response will be increased in depth followed by increase in rate	Lecture/discussion

Limited Respiratory Care

Unit II. Recall concepts related to respiratory care: cardio-respiratory anatomy, respiratory care pharmacology, and acid-base balance.

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OBJECTIVE	CONTENT	METHOD
	2) Peripheral chemoreceptors	
	a) Location	
	(1) Cortic arch	
	(2) Carotid bodies	
	b) Response to decreased oxygen supply (paO_2) stimulation causes:	
	(1) Increased V_t	
	(2) Increased RR	
	(3) Tachycardia	
	(4) Hypertension	
2.4.1 Describe the role of peripheral and central chemoreceptors in regulation.	3) Role of peripheral and central chemoreceptors in regulation of ventilation	Lecture/discussion
2.4.2 State relationship between hypoxic drive and respiratory drive.	4) Hypoxic Drive	Lecture/discussion
	a) Normal individual's respiratory drive is controlled by $paCO_2$ level	
	b) Chronic respiratory diseased patients have decreased ability to eliminate CO_2 and respiratory centers accommodate to high pCO_2 levels	
	c) RR and depth respond to PO_2 levels below 60 torr	
	d) Dominant control of respiration in these individuals are changes in PO_2	
2.5 Discuss methods for measuring respiratory function.	III. Measure of respiratory function	Lecture/discussion
	A. Respiratory rate	
	1. Normal adult 10-14 BPM	
	2. Infants 40-60 BPM	
	3. Children 24 BPM	

Limited Respiratory Care

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OBJECTIVE	CONTENT	METHOD
2.5.1 List factors that affect respiratory rate.	B. Factors affecting respiratory rate 1. Fever - increased 2. Anxiety - increased 3. Insufficient O ₂ - increased 4. Depressant drugs - decreased 5. Sleep - decreased	
2.5.2 Identify lung volumes and capacities.	C. Lung volumes and capacity	Handout on spirogram
2.5.3 Discuss the methods for measuring respiratory functions.	D. Tidal volume (V _t) 1. Volume of gas inhaled or exhaled during a single respiratory cycle - 500 cc normally - can be measured utilizing Bedside Spirometry E. Dead Space Air - air remaining in air passageways, unavailable for gas exchange - approximately 150 cc's - not measurable F. Alveolar Air - air reaching alveoli for gas exchange - approximately 350 cc's - not measurable G. Minute Volume - Amount of gas moved in and out of respiratory tract per minute. Determined by 1. Tidal volume times RR H. Vital Capacity - VC is the volume of gas that can be forcibly exhaled after a maximal inhalation (usually 3 x V _t). Can be measured by utilizing Bedside Spirometry I. Spirogram 1) Lung volumes - subdivisions of maximum lung volume 2) Combinations - capacities	Lecture/discussion
2.6 Recall concepts related to Acid-Base concepts.	IV. Acid-Base A. O ₂ metabolism at tissues 1. Cellular metabolism byproducts → CO ₂	Lecture/discussion

Limited Respiratory Care

Unit II. Recall concepts related to respiratory care: cardio-respiratory anatomy, respiratory care pharmacology, and acid-base balance.

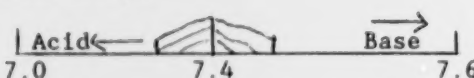
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OBJECTIVE	CONTENT	METHOD
2.6.1 Review Acid-Base principles.	B. pH and PCO₂ relationship 1. $H^+ + HCO_3^- \rightleftharpoons H_2CO_3 \rightleftharpoons H_2O + CO_2$ Hydrogen Sodium Bicarbonate Carbonic Acid Water Carbon Dioxide	
2.6.2 List the ranges for normal pH.	a. Elimination of acid (H⁺) is accomplished through this equation b. As paco₂ increases so will H⁺ which will cause lower pH 2. Normal pH a. 7.35 - 7.45 b. Controlled by respiratory and metabolic component 3. Normal paco₂ a. 35-45 mmHg b. Controlled by respiratory component	Lecture/discussion
2.6.3 Describe relationship of HCO ₃ and kidneys.	C. HCO₃ and kidney function 1. Kidney controls level of HCO₃ 2. Normal HCO₃ a. 24-36 b. Controlled by renal and metabolic component D. Oxygenation 1. Normal paO₂ a. 80-100 mmHg b. Controlled by pulmonary function or other factors	

Limited Respiratory Care

Unit II. Recall concepts related to respiratory care: cardio-respiratory anatomy, respiratory care pharmacology, and acid-base balance.

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OBJECTIVE	CONTENT	METHOD
2.6.4 List the four major components used in interpretation of ABG.	1) Hemoglobin 2) Cellular O₂ requirement 3) Ventilation/Perfusion ratio c. Low oxygenation does not necessarily indicate poor ventilation	
	E. 4 main components of ABG interpretation 1. Look at pH	Lecture/discussion
		
	2. Look at paco₂ level a. Hypoventilation will increase paco₂ - Respiratory Acidosis b. Hyperventilation will decrease paco₂ - Respiratory Alkalosis c. paco₂ level is controlled by rate and depth of ventilation 3. Look at HCO₃ level a. Decreased HCO₃ b. Increased HCO₃ c. HCO₃ - level is controlled by kidneys 4. Oxygenation (paO₂) levels a. Normal paO₂ is 80-100 mmHg b. Decreased paO₂ (below 80 mmHg) 1) Hypoxia - severity depends on factors causing hypoxemia 5. Recommended sequence a. Look at pH first b. Look at paco₂ second c. Look at HCO₃ third d. Look at paO₂ fourth	

Limited Respiratory Care

Unit II. Recall concepts related to respiratory care: cardio-respiratory anatomy, respiratory care pharmacology, and acid-base balance.

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OBJECTIVE	CONTENT	METHOD
2.6.5 Identify and define the four major ABG components.	F. Interpretation of 4 major ABG components 1. Acidosis a. $\text{pH} < 7.35$ b. Three possible causes of acidosis 1) Respiratory acidosis a) Caused by increased pCO_2 b) pH decreased, pCO_2 increased, HCO_3 normal or increased 2) Metabolic acidosis a) Caused by decreased HCO_3 b) pH decreased, pCO_2 normal or decreased, HCO_3 decreased 3) Combined acidosis a) Caused by increased pCO_2 and decreased HCO_3 b) pH decreased, pCO_2 increased, HCO_3 decreased 2. Alkalosis a. $\text{pH} > 7.45$ b. Three possible causes of alkalosis 1) Respiratory alkalosis a) Caused by decreased pCO_2 b) pH increased, pCO_2 decreased, HCO_3 normal or decreased 2) Metabolic alkalosis a) Caused by increased HCO_3 b) pH increased, pCO_2 normal or increased, HCO_3 increased 3) Combined alkalosis a) Caused by decreased pCO_2 and increased HCO_3 b) pH increased, pCO_2 decreased, HCO_3 increased	Lecture/discussion

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Limited Respiratory Care

Unit II. Recall concepts related to respiratory care: cardio-respiratory anatomy, respiratory care pharmacology, and acid-base balance.

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OBJECTIVE	CONTENT	METHOD
2.6.6 Interpret clinical ABG's.	G. Day-Day Clinical application 1. ph 7.30 paCO_2 50 paO_2 70 HCO_3 24 Interpretation - respiratory acidosis Recommendation - Increase ventilation low flow O_2 therapy 2. ph 7.24 paCO_2 48 paO_2 90 HCO_3 15 Interpretation - metabolic acidosis Recommendation - correct underlying problem, possibly HCO_3 IV 3. ph 7.10 paCO_2 60 paO_2 44 HCO_3 12 Interpretation - combined acidosis Recommendation - increase ventilation possibly add IV bicarbonate (HCO_3) oxygen therapy 4. ph 7.56 paCO_2 33 paO_2 94 HCO_3 40 Interpretation - metabolic alkalosis Recommendation - correct underlying condition	Lecture/discussion Practice ABG interpretation

Limited Respiratory Care

Unit II. Recall concepts related to respiratory care: cardio-respiratory anatomy, respiratory care pharmacology, and acid-base balance.

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OBJECTIVE	CONTENT	METHOD
	5. ph 7.60 paCO ₂ 24 paO ₂ 90 HCO ₃ 26 Interpretation - respiratory alkalosis Recommendation - treat underlying cause	
	6. ph 7.60 paCO ₂ 18 paO ₂ 88 HCO ₃ 38 Interpretation - combined alkalosis Recommendation - rarely occurs treatment difficult	
2.7 Recall concepts related to respiratory care pharmacology.	V. Pharmacology of respiratory care	Lecture/discussion
	A. Autonomic Nervous System	
	1. Sympathetic (Adrenergic) System	
	a. Alpha response (artery)	
	1) Vasoconstriction	
	b. Beta response	
	1) Beta ₁	
	a) Increased heart rate	
	b) Increased heart force	
	2) Beta ₂	
	a) Bronchodilation	
	2. Parasympathetic (cholinergic)	
	a. Decreased HR	
	b) Increase GI tract activity and saliva production	
	c) Vasodilation	
	d) Bronchoconstriction	
	B. Modes of administration	
	1. Intravenous - general systemic effect	
	2. Intramuscular	
2.7.1 Review respiratory care pharmacology.		
2.8 Review medications that affect the respiratory system.		

Limited Respiratory Care

Unit II. Recall concepts related to respiratory care: cardio-respiratory anatomy, respiratory care pharmacology, and acid-base balance.

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OBJECTIVE	CONTENT	METHOD
	5. Antibiotics	
	6. Antitussives	
	E. Drug Preparation/Administration	
	1. Solute - what dissolved (drug)	
	2. Solvent - fluid in which drug is dissolved	
	3. 1 gram - 1000 milligrams	
	4. 1:1000 means: 1 milligrams solute to 1000 milligram solvent	
	5. 1% solution - 1 mg solute to 100 mg solution	
	6. Many drugs are available in unit dose with standard dilutions. Other drugs may need to be diluted as ordered	

Limited Respiratory Care

Unit III. Perform respiratory patient assessment by using information in medical records, breathing patterns, etc.

Time: 3-4 hours

OBJECTIVE	CONTENT	METHOD
3.0 Identify through appropriate patient assessment the clinical needs of each patient on an individual basis. This will be accomplished by: 3.0.1 Review the medical record.	I. Assessment A. Components of medical record 1. History and physical a. Current complaint b. Pertinent past history c. Family history d. Admitting diagnosis 2. Laboratory reports--Normal-Abnormal values a. CBC 1) Adequate hemoglobin? 2) Elevated white count? b. Electrolyte profile c. Blood gas results d. Electrocardiogram results e. Sputum culture results 3. Progress reports 4. Nursing notes a. Temperature b. Vital signs 5. Medication record a. Drug allergies 6. Respiratory therapy record	Lecture/discussion Actual case study presentation/chart reviews Skills checklist 3-1 "Chart Review"
3.0.2 Perform gross assessment on a patient with respiratory needs. 3.0.3 Assess patient appearance for evaluation of respiratory care needs.	B. Gross assessment 1. Assessment patient's appearance a. Patient's color b. Patient's position c. Skin integrity d. Type and position of external tubes e. Equipment being used 1) Oxygen 2) Suction	Demonstrate assessment Skills checklist 3-2 "Gross Assessment"

Limited Respiratory Care

Unit III. Perform respiratory patient assessment by using information in medical records, breathing patterns, etc.

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OBJECTIVE	CONTENT	METHOD
3.0.4 Assess patient breathing pattern.	2. Patient's breathing pattern a. Count respiratory rate (compare to nursing notes) b. Depth of respirations c. Ventilatory patterns 1) Cheyne-Stokes 2) Tachypnea 3) Biots d. Audible sounds 1) Wheezes 2) Stridor 3) Snoring	Lecture/discussion Demonstration
3.0.5 Describe how physical deformities can affect a patient's respiratory status.	3. Physical deformities a. Abnormality of throat b. Clubbing of the digits c. Engorgement of superficial veins d. Uneven movement of chest wall e. Other pertinent obvious deformity 1) Amputation	Lecture/discussion
3.0.6 Describe how mental/emotional state affects patient's respiratory assessment.	4. Assessment of patient's mental or emotional state a. Oriented to time or place b. Alert state c. Anxious or comfortable d. Speech pattern	
3.1 Perform a pulmonary assessment.	C. Pulmonary assessment	Lecture/discussion
3.1.1 Evaluate cough effectiveness/sputum classification.	1. Cough effectiveness/sputum classification a. Nonproductive cough b. Volume of sputum c. Color of sputum d. Viscosity of sputum e. Speech pattern	Demonstration/Return Demonstration

Unit III. Perform respiratory patient assessment by using information in medical records, breathing patterns, etc.

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OBJECTIVE	CONTENT	METHOD
3.1.2 Perform auscultation to evaluate patient's respiratory status.	2. Auscultation a. Potential contributors to abnormal breath sounds 1) Deformities, scars, symmetry, bruises 2) Chest tubes, dressings, external tubes b. Performs auscultation 1) Stethoscope placed correctly in ears with tips down and inward 2) Diaphragm placed flat on chest 3) Full respiratory cycle auscultated at each location a) 8 positions minimum (1) 6 anterior (2) 2 posterior	Demonstration/Return Demonstration Lecture/discussion Skills checklist 3-3 "Auscultation"
3.1.3 Identify the listed breath sounds.	4. Identifies the lobe being auscultated 5. Breath sounds a. Crackles b. Wheezes c. Stridor d. Diminished breath sounds	Demonstrate Teaching stethoscope Breath sounds tape
3.2 Performs bedside spirometry screening to effectively evaluate lung functions.	D. Screening Spirometry 1. Bedside spirometry a. Assembles equipment properly b. Identifies and instructs patient in proper maneuver c. Performs Forced Vital Capacity maneuver according to facility policy d. Normal/abnormal ranges	Return demonstration Skills checklist 3-4 "Screening Spirometry"

Limited Respiratory Care

Unit III. Perform respiratory patient assessment by using information in medical records, breathing patterns, etc.

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OBJECTIVE	CONTENT	METHOD
3.3 Perform Hypoxia evaluation in assessment of respiratory care patient.	2. Hypoxia evaluation a. Patient's respiratory pattern b. Patient's color/nail beds/earlobes c. Patient's complaint (if applicable) d. Patient's orientation 1) Confusion 2) Irritation 3) Combativeness 4) Anxious/restless e. Applies pulse oximetry when indicated and recognizes values outside normal range f. Recognizes conditions which warrant further evaluation; i.e., ABG, chest x-ray	
3.4 Utilize laboratory data to evaluate respiratory care patient.	E. Laboratory data - Normal-Abnormal Values 1. CBC a. WBC elevated? b. Adequate hemoglobin? 2. Sputum culture results 3. Electrolyte profile 4. Electrocardiogram interpretation 5. Arterial blood gas interpretation and application a. ph - indicator of acid-base status b. paCO_2 - indicator of ventilatory status c. paO_2 - indicator of oxygenation status d. HCO_3 - indicator metabolic/compensatory component	
3.4.1 Identify common conditions associated with laboratory reports.	a. ph - indicator of acid-base status b. paCO_2 - indicator of ventilatory status c. paO_2 - indicator of oxygenation status d. HCO_3 - indicator metabolic/compensatory component	Discussion/Lecture
3.4.2 Recognize values outside normal range, recommending appropriate O_2 therapy in accordance with ABG interpretation.		

Limited Respiratory Care

Unit III. Perform respiratory patient assessment by using information in medical records, breathing patterns, etc.

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OBJECTIVE	CONTENT	METHOD
3.4.3 Identify indications for ventilatory support recognized and assist respiratory care practitioner with initiation and evaluation of patient being mechanically ventilated.		
3.4.6 Identify respiratory conditions that can be detected with chest x-rays.	6. Chest x-ray report a. Pneumonia b. Pleural effusions c. COPD (emphysema) d. Atelectasis	Lecture/discussion

Limited Respiratory Care

Skills Checklist 3-1 CHART REVIEW

Introduction

A thorough chart review should be done on every patient therapy is given to. It is essential that you not only know your patient well, but be able to apply the knowledge obtained in the chart to a mode of therapy that will be the most beneficial to your patient's needs.

Procedure

Lab

Clinical

I. Confirms Order:

- A. Compares order to requisition
- B. Insures completeness of order
- C. Calls physician to rectify all discrepancies
- D. Notes special considerations (nonroutine characteristics)
- E. Fills out appropriate paperwork

_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

II. Identifies Relevant Data:

- A. History and physical
- B. Primary and secondary diagnosis
- C. Progress reports
- D. Radiology report (x-ray)
- E. Laboratory report:
 - 1. Sputum culture
 - 2. Blood gas report
- F. Pulmonary function studies
- G. Nursing notes (temperature and vital signs)
- H. Medication record (drug allergies)
- I. Respiratory therapy record (how last treatment was tolerated)

_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

III. Draws Conclusions Relevant to Therapy:

- A. Indications
- B. Hazards
- C. Contraindications

_____	_____	_____
_____	_____	_____
_____	_____	_____

IV. Returns Chart to Proper Location

_____	_____	_____
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Pass/Fail _____ Date _____

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Limited Respiratory Care

Skills Checklist 3-2

GROSS ASSESSMENT

Introduction

Gross assessment is the first tool used in evaluating a patient. Some form of gross assessment should be done each time a patient's room is entered. More entailed gross assessment should be done the first time a patient is approached.

Procedure

Lab

Clinical

I. Assesses Patient's Appearance:

- | | | | |
|---|-------|-------|-------|
| A. Describes patient's color (cyanosis, pallor, flushed) | _____ | _____ | _____ |
| B. Describes patient's position | _____ | _____ | _____ |
| C. Describes skin integrity (warm, dry; diaphoretic) | _____ | _____ | _____ |
| D. Describes type and position of external tubes | _____ | _____ | _____ |
| E. Describes equipment being used (oxygen, suction, etc.) | _____ | _____ | _____ |

II. Assesses Patient's Breathing Patterns:

- | | | | |
|---|-------|-------|-------|
| A. Counts respiratory rate (compare to nursing notes) | _____ | _____ | _____ |
| B. Describes depth of respiration | _____ | _____ | _____ |
| C. Describes ventilatory patterns | _____ | _____ | _____ |
| D. Describes audible sounds (wheezes, stridor, snoring, etc.) | _____ | _____ | _____ |

III. Assesses Physical Deformities:

- | | | | |
|---|-------|-------|-------|
| A. Describes any abnormality of the thorax | _____ | _____ | _____ |
| B. Describes any clubbing of the digits | _____ | _____ | _____ |
| C. Describes any engorgement of superficial veins | _____ | _____ | _____ |
| D. Describes any uneven movement of the chest wall | _____ | _____ | _____ |
| E. Describes any other pertinent obvious deformity (amputation, distention, prominence) | _____ | _____ | _____ |

IV. Assesses Patient's Mental or Emotional State:

- | | | | |
|--|-------|-------|-------|
| A. Describes if patient is oriented (to time and to place) | _____ | _____ | _____ |
| B. Describes patient's alert state | _____ | _____ | _____ |
| C. Describes if patient is anxious or comfortable | _____ | _____ | _____ |
| D. Describes patient's speech pattern | _____ | _____ | _____ |

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Limited Respiratory Care

Skills Checklist 3-3 AUSCULTATION

Introduction

Auscultation should be done and reported on each patient treatment and during diagnostic assessment. The evaluation of disease states and responses to therapy relies on the ability to auscultate effectively.

Procedure

Lab

Clinical

I. Prepares the Patient:

- | | | | |
|--|-------|-------|-------|
| A. Completes procedure for chart review | _____ | _____ | _____ |
| B. Completes procedure for handwashing technique | _____ | _____ | _____ |
| C. Completes procedure for patient preparation | _____ | _____ | _____ |
| D. Patient is insured that he/she is in an upright position | _____ | _____ | _____ |
| E. Makes sure the room is quiet (turn off TV, etc.) | _____ | _____ | _____ |
| F. Removes or loosens clothing to enable auscultation on bare skin | _____ | _____ | _____ |
| G. Gives patient the proper breathing instructions (slow, deep respirations through the mouth) | _____ | _____ | _____ |

II. Inspects Chest:

- | | | | |
|--|-------|-------|-------|
| A. Potential contributors to abnormal breathing sounds | | | |
| 1. Deformities, scars, symmetry, bruises | _____ | _____ | _____ |
| 2. Chest tubes, dressings, external tubes | _____ | _____ | _____ |

III. Performs Auscultations:

- | | | | |
|--|-------|-------|-------|
| A. Stethoscope placed correctly in ears, with tips down and inward | _____ | _____ | _____ |
| B. Diaphragm or bell placed flat on chest | _____ | _____ | _____ |
| C. Full respiratory cycle auscultated at each location (eight positions minimum) | _____ | _____ | _____ |
| D. All locations auscultated in correct sequence | | | |
| 1. Posterior chest | _____ | _____ | _____ |
| 2. Anterior chest | _____ | _____ | _____ |
| E. Identifies properly the lobe being auscultated | _____ | _____ | _____ |
| F. Describes each of these sounds: | | | |
| 1. Fine rales | _____ | _____ | _____ |
| 2. Course rales | _____ | _____ | _____ |
| 3. Wheezes (sibilant rhonchi) | _____ | _____ | _____ |
| 4. Stridor | _____ | _____ | _____ |
| 5. Diminished breath sounds | _____ | _____ | _____ |

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Limited Respiratory Care

Skills Checklist 3-4 SCREENING SPIROMETRY

Introduction

Screening spirometry provides basic diagnostic information about the patient's pulmonary status. Screening spirometry usually includes, but is not limited to, FVC, Fev₁, 2, 3, FEF 25-75, PEF and MUV. This competency assesses the ability to coach the patient to perform the required maneuver(s) and to operate the necessary equipment.

<u>Procedure</u>	<u>Lab</u>	<u>Clinical</u>
I. Assembles Equipment Appropriately	_____	_____
II. Performs Calibration as Recommended by Manufacturer	_____	_____
III. Enters Patient Data Accurately	_____	_____
IV. Washes Hands	_____	_____
V. Instructs Patient in Procedures	_____	_____
VI. Performs FVC Maneuver 3 times	_____	_____
VII. Selects Best FVC	_____	_____
VIII Administers Bronchodilator if Ordered via HHN or MDI	_____	_____
IX. Repeats V - VII	_____	_____
X. Prepares Reports Including Comments	_____	_____

Pass/Fail _____ Date _____

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Limited Respiratory Care

Unit IV. Provide oxygen therapy.

Time: 6-8 hours

OBJECTIVE	CONTENT	METHOD
4.0 Identify through appropriate patient assessment the clinical needs of O ₂ therapy with application to specific disease entities following criteria established by RCP. Be familiar with and/or demonstrate the use of: 4.0.1 Define low flow O ₂ therapy.	I. Oxygen therapy A. Goals of O ₂ Therapy 1. Treat hypoxemia 2. Decrease WOB 3. Decrease myocardial work B. Low Flow O ₂ Therapy 1. Definition a. Low flow system is one in which gas flow of the apparatus is insufficient to meet all inspiratory requirements b. Mechanics of low flow O ₂ therapy 1) Low flow O ₂ delivered to designated reservoir 2) Reservoir concentrates O ₂ and increases F _I O ₂ 3) During inspiration, room air mixed with O ₂ from reservoir provides F _I O ₂ to patient c. Variables that affect F _I O ₂ 1) Capacity of oxygen reservoir 2) Oxygen flow 3) Patient's ventilatory pattern d. Criteria for use of low-flow O ₂ therapy systems 1) Tidal volume - 300-700 ml 2) Ventilatory rate - below 25 3) Ventilatory pattern - regular and consistent	Lecture/discussion
4.0.2 Identify the variables that affect F _I O ₂ .	2. Cannula a. Provides F _I O ₂ between 22% and 40% (1/2 L/m - 6 L/m) 1) L/m - 24% 2) L/m - 28% 3) L/m - 32%	Demonstration Skills checklist 4-1 "Cannula with/without Humidifier"

Limited Respiratory Care

Unit IV. Provide oxygen therapy.

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OBJECTIVE	CONTENT	METHOD
	4) L/m - 36%	
	5) L/m - 40%	
	b. Reservoir with this system is the nasopharyngeal space	
	c. $F_{I}O_2$ variations due to breathing pattern	
	1) Hypoventilation - increased $F_{I}O_2$	
	2) Hyperventilation - decreased $F_{I}O_2$	
	d. Tolerated well by patient	
	e. Humidification optional	
4.0.3 Identify uses of low flow O_2 .	f. Recommendations for use	
	1) Continuous home oxygen therapy	
	2) Transportation of hypoxic patients	
	3) Most hospital patients who require O_2 supplementation up to 40% O_2	
4.0.4 Identify the uses of a simple mask in providing O_2 therapy.	3. Simple mask	Lecture/discussion
	a. Wide range $F_{I}O_2$ variability	Demonstration
	Run at 6 L/m - 8 L/m (44%-52% approximately. NEVER RUN BELOW 6 L/m DUE TO POSSIBLE BUILD-UP OF CO_2 IN MASK	Skills checklist 4-2 "Simple Mask With Humidifier"
	b. Reservoir is O_2 tubing and mask	
	c. Not efficient mode of O_2 therapy delivery for long term use	
	d. Unable to analyze oxygen efficiently	
4.0.5 List the recommended uses of a simple mask.	e. Recommendations for use	
	1) Transportation of hypoxic patients	
	2) Short term O_2 therapy	
4.0.6 Describe the uses of partial rebreather/nonrebreather in O_2 therapy.	4. Partial rebreather/nonrebreather	Lecture/discussion
	a. Delivers 60%-90% O_2 (6-10 L/m)	Demonstration
	1) Tight fitting mask with a reservoir bag attached allows high $F_{I}O_2$ to be delivered	Skills checklist 4-3 "Partial Rebreather/Nonrebreather"

Unit IV. Provide oxygen therapy.

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OBJECTIVE	CONTENT	METHOD
4.0.7 Identify the two ways the device can be used.	2) By increasing reservoir capacity we can increase $F_{I}O_2$ available b. Reservoir is bag, mask and tubing c. Good for short term support hours for patients who require a high $F_{I}O_2$ d. Not efficient mode of delivery for long term use e. Device can actually be used in 2 ways 1) Without a one way valve between bag and mask this apparatus is called a partial rebreather mask a) In theory, it is an oxygen reservoir bag b) First 1/3 of exhalation goes back into bag. This is dead space air with minimal CO_2 in it c) Allows bag to contain oxygen enriched air 2) With a one way valve in place apparatus becomes a nonrebreather-- patient draws only 100% O_2 from reservoir bag	Lecture/discussion Demonstration
4.0.8 List the recommended uses of rebreather/nonrebreather devices.	f. Recommendations for use 1) Nonintubated, hypoxic patient who requires $F_{I}O_2$'s > 60% O_2 2) Used on short term basis 3) If removed frequently for suctioning and/or not tight fitting mask, an immediate drop in $F_{I}O_2$ and resultant hypoxia will occur	Lecture/discussion

Limited Respiratory Care

Unit IV. Provide oxygen therapy.

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OBJECTIVE	CONTENT	METHOD
4.1 Describe the principles of and uses of high flow O ₂ therapy.	C. High flow O ₂ therapy 1. Definition a. Gas flow of apparatus is sufficient to meet all inspiratory requirements HAFOE (High Air Flow Oxygen Enrichment) b. Mechanics of high flow O ₂ therapy 1) Principles of gas entrainment devices 2) The flow rate and reservoir capacity are adequate to provide the total inspired atmosphere 3) Both high and low oxygen concentrations may be administered by high flow systems	Lecture/discussion
4.1.1 List advantages of venturi mask to accomplish high flow O ₂ .	2. Entrainment Devices a. Venturi mask 1) Provides concentrations of 24-40% utilizing venturi principle 2) Three major advantages of high flow systems a) Consistent F _I O ₂ are provided regardless of patient's ventilatory pattern b) Temperature and humidity of gas may be controlled c) F _I O ₂ can be directly measured with an oxygen analyzer	Lecture/discussion Clinical demonstration
4.1.2 Identify recommended uses of venturi mask	3) Recommendations for use a) If not for disadvantages of economics and patient comfort, high flow O ₂ therapy (venti-masks and aerosol generators)	Lecture/discussion Skills checklist 4-4 "Entrainment Devices - Venturi Mask"

Unit IV. Provide oxygen therapy.

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OBJECTIVE	CONTENT	METHOD
	should be method of choice for O ₂ therapy	
	b) Good for emphysematous patients with varying respiratory/ventilatory patterns	
	c) For patients who cannot tolerate nasal cannula	
4.1.3 Describe principles and uses of aerosol generators.	b. Aerosol generators (venturi devices)	Lecture/discussion
	1. Provides concentrations from 24-100% utilizing venturi principle	Demonstration
	2. Three major advantages of high flow systems	Skills checklist 4-5
	a) Consistent and variable F _I O ₂ 's are provided irregardless of s patient's ventilatory problems	"Entrainment Devices - Aerosol"
	2) Temperature and humidity of gas may be controlled	
	3) F _I O ₂ can be directly measured with an oxygen analyzer	
	4) Can be adapted to various masks, t-pieces, etc.	
4.1.4 Identify recommended uses of aerosol generators.	3. Recommendations for use	
	a) High flow O ₂ therapy should be method of choice. Applicable to all patient care settings from 24-100% O ₂	
4.2 Monitor oxygen delivery systems.	D. O ₂ Monitoring	Lecture/discussion
4.2.1 Demonstrate proper calibration procedure.	1. O ₂ Analyzers	Demonstration
	a. Calibration - manufacturer's recommendation	
4.2.2 Demonstrate the use of pulse oximetry in evaluation of clinical hypoxia.	b. Utilization	
	c. Troubleshoot	

Limited Respiratory Care

Unit IV. Provide oxygen therapys.

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OBJECTIVE	CONTENT	METHOD
4.2.3 Troubleshoot and identify problems and make corrections.	2. Oximeters	
4.2.4 Describe relationship between O ₂ saturation and paO ₂ in the clinical setting.	a. Calibrate	
	b. Use	
	c. Troubleshoot	
	3. Temperature devices	
	4. Correlate ABG's with O ₂ monitoring	
	E. Clinical hypoxia	Demonstration
	1. Vital capacity	Skills checklist 4-6 "Vital Capacity"
	2. Tidal Volume, et al	Skills checklist 4-7 "Tidal Volume ..."
4.3 Describe safety methods for providing respiratory care.	F. O ₂ systems safety precautions	Lecture/discussion
4.3.1 List precautions for using O ₂ system.	1. Fire safety	
	a. O ₂ supports combustion	
	1) Familiarity with hazards	
	a) Smoking	
	b) Oil-based material (vaseline, face lotion)	
	c) Open flames	
	d) Electric heaters	
	b. Handle all O ₂ systems correctly	
	c. Precautionary signs that are readable from a distance of 5 feet should be posted	
	d. Precautionary labeling on tanks	
	1) Chemical name legible	
	2) Labeling cannot be removed readily	
	3) Precautionary information relative to handling, storage, use should be on labels.	
4.3.2 State information that should be included on O ₂ labels.	4) Warning statements be included in labeling of any container of gas	

Unit IV. Provide oxygen therapy.

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OBJECTIVE	CONTENT	METHOD
4.3.3 Identify safety systems for using standardized valve-outlet connections.	G. Standardized valve outlet connections 1. ASSS - American Standard Safety System a. Nominter changeable connections of medical gas equipment based on cylinder outlet and nipple 2. DISS - Diameter Index Safety System a. Standards of medical gas equipment which operates at pressures of 200 psig or less b. Used on low pressure outlets (regulators) c. Achieved by a series of increased and decreased diameters in the connection 3. PISS - Pin Index Safety System a. Safety system applicable to valve outlets of small cylinders up to size E utilizing a yoke/pin connection b. Yoke/pin examples: 1) O₂ $\longleftrightarrow$ 2 and 5 2) CO₂ & O₂ $\longleftrightarrow$ 2 and 6 3) Air $\longleftrightarrow$ 1 and 5 4) Nitrous oxide $\longleftrightarrow$ 3 and 5	Lecture/discussion Demonstration
4.3.4 Determine O ₂ tank identification size and color coding.	c. Clarification of O₂ cylinder size d. Color Coding of O₂ tanks 1) Oxygen - green 2) Carbon dioxide - gray 3) Nitrous oxide - light blue 4) Carbon dioxide and oxygen - gray and green 5) Helium and oxygen - brown and green	Handout for clarification of size of O₂ cylinders Lecture/discussion

Limited Respiratory Care

Unit IV. Provide oxygen therapy.

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OBJECTIVE	CONTENT	METHOD
4.3.5 Describe safe transport of O ₂ tanks.	e. Transportation of cylinders 1) Must be secure 2) Mechanism for transport	Lecture/discussion
4.3.6 List safety precautions for storage of O ₂ tanks.	f. Storage of cylinders 1) Dry, cool environment 2) Never stored by operating room 3) Separate storage areas for gases which support combustion 4) Storage rooms should contain racks fasteners to prevent falling over	Lecture/discussion
4.3.7 Demonstrate safe usage of O ₂ regulators.	g. Regulator 1) Device needed to regulate flow being administered to a patient 2) Two functions: a) Reduces high pressure to working pressure of 50 psig b) Controlled release of gas with a range from 1-15 L/m c) Liter flow set and read at eye level with middle of the float on L/m desired d) Safe use of types of flow meters 3) Procedure a) With cylinder secured, "crack" the tank b) Place regulator on tank with "O" ring in place c) Open tank valve d) Adjusts liter flow e) Closes tank valve f) Bleeds off excess pressure	Demonstration/return demonstration

Unit IV. Provide oxygen therapy.

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OBJECTIVE	CONTENT	METHOD
4.3.8 List the common tank factors used for calculating regulation.	h. Tank factors 1) Common tank factors used a) E - .283 b) D - .16 c) G - 2.41 d) H - 3.14	Lecture/discussion Skills checklist 4-8 and 4-9 "Cylinders Above E" "Cylinders E and Below"
4.3.9 Using the duration flow formula calculate flow.	2) Duration of flow formula a) <u>factor x psig</u> L/m b) Example: <u>.283 x 1000 psig</u> (in tank -70 minutes) 4 L/m	Worksheets
4.4 Describe safe operation of O ₂ home systems.	II. O ₂ home systems A. O ₂ concentrators 1. Operating principles of concentrators a. Molecular sieve bed 2. Approximate F _I O ₂ range 70%-95% O ₂ a. Factors affecting F _I O ₂ 1) Flow rate 2) Deterioration of sieve material 3. Standard flow ranges with concentrators 4. Alarm systems a. Indicate power failure b. Indictors for battery recharging and filters that need cleaning on many O ₂ concentrators 5. Advantages a. Operate from standard electrical source b. Reimbursement easily attainable c. Preventive maintenance minimal	Lecture/discussion Demonstration
4.4.1 Calculate approximate F _I O ₂ range and identify factors the range.		
4.4.2 Identify problems indicated by the alarm system		Lecture/discussion
4.4.3 List advantages and disadvantages of home systems.		

Unit IV. Provide oxygen therapy.

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OBJECTIVE	CONTENT	METHOD
4.4.4 Identify how home liquid systems operate.	6. Disadvantages a. Portability difficult for some patients b. Can generate noise levels in excess of 70 decibels (new concentrators have increased sound insulation capabilities) c. $F_{I}O_2$ difficult to control and (with some concentrators) maintain B. Liquid systems 1. Fractional distillation a. Process of filtering room air and converting to pure liquid oxygen in excess of 99% 2. Containers available a. Large reservoir b. Small portable units 1) Continuous flow 2) Pulse 3) Duration of flow tables per manufacturer 3. Standard flow rates with liquid systems a. at 0.5 L/m increments range is 1 and 3 L/m b. at .25 L/m increments up to 6 L/m 4. Filling portable from base 5. Advantages a. Extremely portable b. Fewer deliveries are required due to longer (extended) duration of flow (see attached table) 6. Disadvantages a. Reimbursement for this portable system is difficult due to medicare guidelines	Lecture/discussion
4.4.5 List advantages and disadvantages of home O_2 systems.		

Unit IV. Provide oxygen therapy.

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OBJECTIVE	CONTENT	METHOD
	b. Water vapor frozen onto the unit may cause malfunction (especially if gas flow from reservoir is high)	
	C. Tanks (compressed gas) 1. Compressed gas cylinders most often used in portable applications 2. Widespread adaptability for short term O₂ therapy requirements 3. Refer to O₂ supply system section for explanation of use, duration of flow calculations of oxygen tanks 4. Advantages a. Portability b. Reimbursement attainable 5. Disadvantages a. Combustion hazards b. Improperly secured tanks may cause "Propelling rocket" if cylinder valve is dislodged c. Mistakes in identification of gas contents and errors in filling cylinder with wrong gas can lead to asphyxia d. More frequent deliveries required for "refills"	

Limited Respiratory Care

Handout

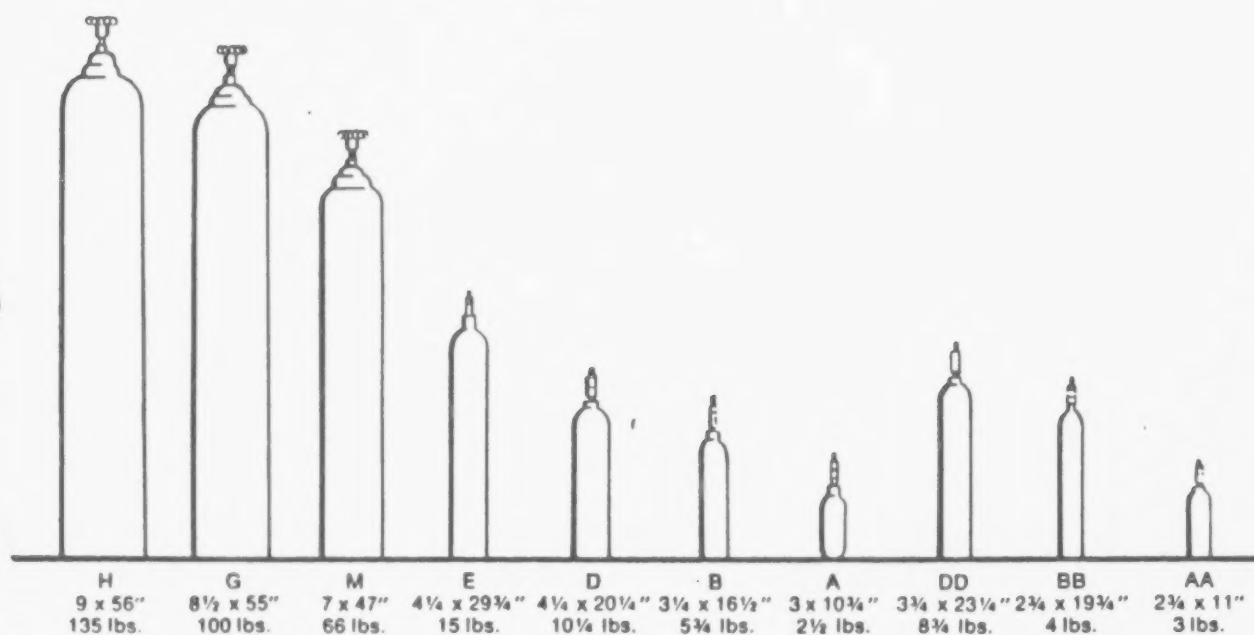


Fig. 15-10. Listing of dimensions and weights of empty cylinders, as well as the net contents of cylinders for all gases listed. The approximate dimensions and weights of empty cylinders include the valves. Note that tank sizes AA through E have flush-type valves, and that the larger tanks (M-H) have diameter-indexed valves. (Modified from Garrett, D. F., and Donaldson, W. P.: Physical Principles of Respiratory Therapy Equipment. Madison, Wisconsin, Ohio Medical Products, 1975)

Limited Respiratory Care

Handout

Duration of Hours of Portable Liquid Oxygen Systems

<u>Liquid</u>	<u>Gas</u>	<u>1-lpm</u>	<u>2-lpm</u>	<u>3-lpm</u>	<u>4-lpm</u>
0.25 1	215 1	3.5	1.7	1.1	0.8
.50 1	430 1	7.1	3.5	2.3	1.7
.75 1	645 1	10.7	5.3	3.5	2.6
1.00 1	860 1	14.3	7.1	4.7	3.5
1.25 1	1075 1	17.9	8.9	5.9	4.4
1.50 1	1290 1	21.5	10.7	7.1	5.3
1.75 1	1505 1	25.0	12.5	8.3	6.2
2.00 1	7120 1	28.6	14.3	9.5	7.1

Limited Respiratory Care

Skills Checklist 4-1 CANNULA WITH/WITHOUT HUMIDIFIER

Introduction

Low flow oxygen therapy is used primarily for comfort and when it is not necessary to know the exact $F_{I}O_2$ a patient is receiving. There are several devices that can be used to deliver low flow oxygen.

Procedure

Lab

Clinical

I. Prepares the Patient:

- | | | | |
|--|-------|-------|-------|
| A. Completes procedure for chart review | _____ | _____ | _____ |
| B. Completes procedure for patient preparation | _____ | _____ | _____ |
| C. Completes procedure for handwashing technique | _____ | _____ | _____ |

II. Assembles Oxygen Cannula With Humidifier:

- | | | | |
|---|-------|-------|-------|
| A. Connects flowmeter to oxygen outlet in the wall | _____ | _____ | _____ |
| B. Connects the humidifier to flowmeter if humidification is clinically indicated. Otherwise connects tubing from cannula to nipple on flowmeter | _____ | _____ | _____ |
| C. Adjusts flow on flowmeter to appropriate level (from one to six liters per minute) | _____ | _____ | _____ |
| D. With finger occlude the outlet part of humidifier to insure patency of pop-off valve. (If there are no leaks, this should cause the humidifier to "whistle". If not, check for leaks.) | _____ | _____ | _____ |
| E. Connects connecting tubing from cannula to outlet port on humidifier; adjust the cannula to patient | _____ | _____ | _____ |
| F. Identifies the ranges of $F_{I}O_2$ this device can deliver. | _____ | _____ | _____ |

III. Completes Procedure:

- | | | | |
|---|-------|-------|-------|
| A. Observes the patient for several minutes to ensure comfort | _____ | _____ | _____ |
| B. Posts "No Smoking" signs on the door and above the patient's bed | _____ | _____ | _____ |
| C. Makes sure the patient understands the smoking policy and reasons for and schedule of oxygen use | _____ | _____ | _____ |
| D. Completes procedure for discontinuing therapy | _____ | _____ | _____ |

Pass/Fail _____ Date _____

Proctor/Instructor's Initials _____ Clinical Site _____

Limited Respiratory Care
Skills Checklist 4-2
SIMPLE MASK WITH HUMIDIFIER

Introduction

Low flow oxygen therapy is used primarily for comfort and when it is not necessary to know the exact $F_{I}O_2$ a patient is receiving. There are several devices that can be used to deliver low flow oxygen.

Procedure

Lab

Clinical

I. Prepare the Patient:

- A. Completes procedure for chart review
- B. Completes procedure for patient preparation
- C. Completes procedure for handwashing techniques

_____	_____	_____
_____	_____	_____
_____	_____	_____

II. Assembles Simple Mask with Humidifier:

- A. Connects flowmeter to the oxygen
- B. Connects humidifier to the flowmeter
- C. Adjusts the flow of the flowmeter to the appropriate level (must be run at no less than 5 liters per minute and no more than 10 liters per minute)
- D. With finger, occludes the outlet port of the humidifier to insure patency of the pop-off valve
- E. Connects connecting tubing from mask to humidifier and properly adjusts it to the patient
- F. Identifies the ranges of $F_{I}O_2$ this device can deliver

_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

III. Completes Procedure:

- A. Observes the patient for several minutes to ensure comfort
- B. Posts "No Smoking" signs on the door and above the patient's bed
- C. Makes sure the patient understands the smoking policy and reasons for and schedule of oxygen use
- D. Completes procedure for discontinuing therapy

_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

Pass/Fail _____ Date _____

Proctor/Instructor's Initials _____ Clinical Site _____

Limited Respiratory Care

Skills Checklist 4-3 PARTIAL REBREATHER/NONREBREATHER

Introduction

Low flow oxygen therapy is used primarily for comfort and when it is not necessary to know the exact $F_{I}O_2$ a patient is receiving. There are several devices that can be used to deliver low flow oxygen.

Procedure

Lab

Clinical

I. Prepare the Patient:

- A. Completes procedure for chart review
- B. Completes procedure for patient preparation
- C. Completes procedure for handwashing techniques

_____	_____	_____
_____	_____	_____
_____	_____	_____

II. Assembles Partial Rebreathing and Nonrebreathing Masks:

- A. Connects flowmeter to the oxygen
- B. Connects humidifier to the flowmeter
- C. Adjusts the flow of the flowmeter to the appropriate level (must be run at no less than 8 liters to insure bag does not completely collapse)
- D. With finger, occludes the outlet port of the humidifier to insure patency of the pop-off valve
- E. Connects connecting tubing from mask to humidifier
- F. Adjusts the mask to the patient
- G. Observes bag to make sure it does not deflate more than two-thirds of the way
- H. Identifies the ranges of $F_{I}O_2$ this device can deliver

_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

III. Completes Procedure:

- A. Observes the patient for several minutes to ensure comfort
- B. Posts "No Smoking" signs on the door and above the patient's bed
- C. Makes sure the patient understands the smoking policy and reasons for and schedule of oxygen use
- D. Completes procedure for discontinuing therapy

_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

Pass/Fail _____ Date _____

Proctor/Instructor's Initials _____ Clinical Site _____

Limited Respiratory Care

Skills Checklist 4-4 ENTRAINMENT DEVICES (VENTURI MASK) WITH/WITHOUT AEROSOL

Introduction

High flow oxygen is defined as supplying all of the patient's minute ventilation. It is used when it is important to know exactly what $F_{I}O_2$ is delivered to the patient. It can deliver high or low concentration of oxygen.

Procedure

Lab

Clinical

- | | | | |
|--|-------|-------|-------|
| I. Prepare the Patient: | | | |
| A. Completes procedure for chart review | _____ | _____ | _____ |
| B. Completes procedure for patient preparation | _____ | _____ | _____ |
| C. Completes procedure for handwashing techniques | _____ | _____ | _____ |
| II. Assembles Venti-Mask Without Aerosol: | | | |
| A. Connects flowmeter to the oxygen | _____ | _____ | _____ |
| B. Assembles the venti with the proper $F_{I}O_2$ adapter. Knows the flow liters per minute to be delivered at | _____ | _____ | _____ |
| C. Connects connecting tubing from venti to the nipple of the flowmeter | _____ | _____ | _____ |
| D. Adjusts the flow on the flowmeter to the appropriate level | _____ | _____ | _____ |
| E. If aerosol is clinically indicated, perform the following three steps: | | | |
| 1. Assembles the aerosol generator and connects the flowmeter to an <u>air</u> outlet | _____ | _____ | _____ |
| 2. Adjusts flow and venturi to obtain desired aerosol output | _____ | _____ | _____ |
| 3. Places corrugated tubing from the aerosol to aerosol adapter on venti | _____ | _____ | _____ |
| F. Adjusts the venti-mask to the patient | _____ | _____ | _____ |
| G. Instructs the patient that, when taking the mask off to eat, etc. he/she must use the cannula at approximately the same $F_{I}O_2$ as per order | _____ | _____ | _____ |
| III. Completes Procedure: | | | |
| A. Observes the patient for several minutes to ensure comfort | _____ | _____ | _____ |
| B. Posts "No Smoking" signs on the door and above the patient's bed | _____ | _____ | _____ |
| C. Makes sure the patient understands the smoking policy and reasons for and schedule of oxygen use | _____ | _____ | _____ |
| D. Communicates to nursing staff specific instructions or observations | _____ | _____ | _____ |
| E. Completes procedure for discontinuing therapy | _____ | _____ | _____ |

Pass/Fail _____ Date _____

Proctor/Instructor's Initials _____ Clinical Site _____

Limited Respiratory Care

Skills Checklist 4-5 ENTRAINMENT DEVICES (AEROSOL) WITH FACE MASK, T-PIECE, TRACH COLLAR

Introduction

High flow oxygen is defined as supplying all of the patient's minute ventilation. It is used when it is important to know exactly what $F_{I}O_2$ is delivered to the patient. It can deliver high or low concentration of oxygen.

Procedure

Lab

Clinical

I. Prepare the Patient:

- | | | | |
|---|-------|-------|-------|
| A. Completes procedure for chart review | _____ | _____ | _____ |
| B. Completes procedure for patient preparation | _____ | _____ | _____ |
| C. Completes procedure for handwashing techniques | _____ | _____ | _____ |
| D. If necessary, determines patient's minute ventilation by measuring tidal volume and multiplying by the respirations per minute | _____ | _____ | _____ |

II. Assembles Aerosol Generator With Face Mask or Face Tent:

- | | | | |
|--|-------|-------|-------|
| A. Connects flowmeter to the oxygen | _____ | _____ | _____ |
| B. Assembles aerosol generator and connects to flowmeter | _____ | _____ | _____ |
| C. Adjusts venturi adapter on aerosol to the desired $F_{I}O_2$ to be delivered. Analyzes to insure correct $F_{I}O_2$ | _____ | _____ | _____ |
| D. Adjusts the flow on the flowmeter to 10 liters per minute or above | _____ | _____ | _____ |
| E. Connects corrugated tubing from aerosol to face mask or face tent, t-piece or trach collar | _____ | _____ | _____ |
| F. Adjusts the face mask, face tent, t-piece, or trach collar to the patient | _____ | _____ | _____ |
| G. If t-piece is used, connects corrugated tubing from aerosol to t-piece and reservoir tubing (usually 50 cc, but can be longer if total flow does not meet minute ventilation) | _____ | _____ | _____ |
| H. Instructs the patient that, when taking the mask off to eat, etc. he/she must use the cannula at approximately the same $F_{I}O_2$ as per order | _____ | _____ | _____ |

III. Completes Procedure:

- | | | | |
|---|-------|-------|-------|
| A. Observes the patient for several minutes to ensure comfort | _____ | _____ | _____ |
| B. Posts "No Smoking" signs on the door and above the patient's bed | _____ | _____ | _____ |
| C. Makes sure the patient understands the smoking policy and reasons for and schedule of oxygen use | _____ | _____ | _____ |

Limited Respiratory Care
Skills Checklist 4-5 (continued)

- D. Communicates to nursing staff specific
instructions or observations _____
E. Completes procedure for discontinuing therapy _____

Pass/Fail _____ Date _____

Proctor/Instructor's Initials _____ Clinical Site _____

Limited Respiratory Care

Skills Checklist 4-6 VITAL CAPACITY

Introduction

Vital capacity is defined as the maximum amount of gas that can be expelled from the lungs by forceful effort following a maximum inspiration. A decrease in vital capacity is a useful tool in assessing the progression of disease. It is essential that proper techniques are used and the best efforts are achieved.

Procedure

Lab

Clinical

I. Prepare the Patient:

- A. Completes procedure for chart review
- B. Completes procedure for patient preparation
- C. Completes procedure for handwashing techniques
- D. Places patient in an upright position

_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

II. Implements Procedure:

- A. Connects the patient to the spirometer
- B. Instructs the patient to perform a vital capacity maneuver (very large inhalation with an exhalation until all his/her air is out). Practice if necessary
- C. Has patient, on instruction, perform the procedure
- D. Encourages patient to do the best effort possible
- E. Repeats the procedure until it is felt that the very best effort is obtained (usually a minimum of three attempts)
- F. Selects and records the patient's best effort

_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

III. Completes Procedure for Discontinuing Therapy

_____	_____	_____
-------	-------	-------

Pass/Fail _____ Date _____

Proctor/Instructor's Initials _____ Clinical Site _____

*The spirometer may not be accurate at flows lower than 3 liters per minute or higher than 250 liters per minute. If it is suspected that the patient can deliver over 250 liters per minute peak flow, do not have him/her blow forcibly into the spirometer.

Limited Respiratory Care

Skills Checklist 4-7

TIDAL VOLUME, MINUTE VOLUME AND RESPIRATORY RATE

Introduction

Bedside volumes are a valuable tool for assessing the patient's ventilatory effort. Because the volumes are compared in a series, it is important that techniques are the same and that an accurate evaluation is done.

Procedure

Lab

Clinical

I. Prepares the Patient:

- A. Completes procedure for chart review
- B. Completes procedure for patient preparation
- C. Completes procedure for handwashing techniques
- D. Places patient in an upright position

_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

II. Implements Procedure:

- A. Instructs patient to breath normally
- B. Connects patient to spirometer
- C. Zeros Spirometer and begins counting respirations:
 - 1. The minute volume divided by the respiratory rate is the approximate tidal volume

_____	_____	_____
_____	_____	_____
_____	_____	_____

III. Completes Procedure for Discontinuing Therapy

_____	_____	_____
-------	-------	-------

Pass/Fail _____ Date _____

Proctor/Instructor's Initials _____ Clinical Site _____

Limited Respiratory Care

Skills Checklist 4-8 CYLINDERS E AND BELOW

Introduction

E cylinders and smaller are often used to transport patients within the hospital. Because there are high pressure cylinders, care must always be used when handling them. Refer to National Fire Protection Association's recommendations on handling and storage.

Procedure

Lab

Clinical

- | | | | |
|--|-------|-------|-------|
| I. Identifies the cylinder contents by reading the label. | _____ | _____ | _____ |
| II. Blows the cylinder valve free of dust by "cracking" the tank. | _____ | _____ | _____ |
| III. Places the washer around the projection and fits the pins of the regulator into proper place on the cylinder neck | _____ | _____ | _____ |
| IV. Tightens the screwlike handle on the regulator yolk until the regulator is firmly attached and there are no leaks | _____ | _____ | _____ |
| V. Opens the tank valve and records the contents of the cylinder. Calculates how long the tank will last at the liter flow given | _____ | _____ | _____ |

Pass/Fail _____ Date _____

Proctor/Instructor's Initials _____ Clinical Site _____

Limited Respiratory Care

Skills Checklist 4-9 CYLINDERS ABOVE E

Introduction

Although large cylinders are not used as frequently in hospitals there are still areas where they must be utilized. These cylinders are high pressure and must be handled with care. Refer to the National Fire Protection Association's recommendations on handling and storage.

Procedure

	<u>Lab</u>	<u>Clinical</u>
I. Identifies the cylinder and contents by reading the label	___	___
II. Blows the cylinder valve free of dust by "cracking" the tank	___	___
III. Places the nut onto the cylinder valve and, with a wrench, makes sure all connections are tight	___	___
IV. Opens the tank valve and records the contents of the cylinder. Calculates how long the tank will last at the liter flow it is to be used at	___	___

Pass/Fail _____ Date _____

Proctor/Instructor's Initials _____ Clinical Site _____

Limited Respiratory Care

Unit V. This unit provides a review of basic respiratory care treatments.

Time: 12 hours--6 hrs class
6 hrs laboratory

OBJECTIVE	CONTENT	METHOD
5.0 Discuss through appropriate clinical assessment the needs of pulmonary hygiene/respiratory care treatments.	I. Treatments	Lecture/discussion
5.1 Identify the common drugs used in respiratory treatments.	A. Medications	Handouts
5.1.1 List the uses of bronchodilators for respiratory treatments.	1. Bronchodilators	
	a. Actions	
	1) Stimulation of Beta ₂ adrenergic (sympathetic) receptors located in bronchioles causing bronchodilation	
	b. Patient application	
	1) Useful in any disease in which increased air flow to lung is desired. Helpful in asthma, bronchitis, COPD, pneumonia, broncheotasis, cystic fibrosis	
	c. Adverse effects	
	1) Related to generalized sympathetic effects	
	a) Tachycardia	
	b) Increased blood pressure	
	2) Less serious effects	
	a) Tremor	
	b) Palpitation	
	c) Headache	
	d) Dizziness	
	e) Nausea	
	d. Contraindications	
	1) Patients with compromised cardiac function especially recent myocardial infarction	
5.1.2 Explain how anticholinergics are used in respiratory treatments.	2. Anticholinergics	Lecture/discussion
	a. Action	Handout
	1) Blocks cholinergic or parasympathetic response and thereby blocks bronchoconstriction	

Limited Respiratory Care

Unit V. This unit provides a review of basic respiratory care treatments.

Page 2

OBJECTIVE	CONTENT	METHOD
5.1.3 Identify the effects of using xanthines in respiratory care treatments.	b. Application 1) Used in conjunction with sympathetic bronchodilators or in patients who cannot tolerate sympathetic bronchodilators 2) Used for bronchitis, emphysema, asthma c. Adverse effects 1) Not life threatening effects including: a) Blurred vision b) Dry mouth c) Pupillary dilation d) Flushed skin e) Difficulty with speech d. Contraindications 1) Patients with glaucoma	Lecture/discussion Handout
	3. Xanthines a. Action 1) Smooth muscle relaxant causing bronchodilation b. Patient application 1) Any patient in need of prolonged dilation c. Adverse effects 1) Tachycardia 2) Vomiting 3) Nausea 4) Decreased blood pressure 5) Dizziness d. Contraindications 1) Use with caution with patients with severe cardiac disease	

Unit V. This unit provides a review of basic respiratory care treatments.

Page 3

OBJECTIVE	CONTENT	METHOD
5.1.4 Explain how mast-cell inhibitors are used in respiratory treatments.	4. Mast-cell inhibitors a. Action 1) Inhibits histamine release and thereby reduces bronchoconstriction b. Patient application 1) Management of bronchial asthma c. Adverse effects 1) Throat irritation 2) Nausea d. Contraindications 1) Use with caution in patients with impaired hepatic and/or renal function	Lecture/discussion Handout
5.1.5 Identify the role corticosteroids play in respiratory treatments.	5. Corticosteroids (oral and aerosolized) a. Action 1) Anti-inflammatory agents 2) Enhances Beta₂ receptor stimulation b. Patient application 1) Severe acute asthma 2) Chronic asthma 3) COPD c. Adverse effects 1) Related to systemic absorption 2) Increased risk for infections 3) Cushing syndrome 4) Obesity 5) Hyperglycemia 6) Mood changes 7) Immunosuppression d. Contraindications 1) Acute infectious diseases	Lecture/discussion Handout

Limited Respiratory Care

Unit V. This unit provides a review of basic respiratory care treatments.

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OBJECTIVE	CONTENT	METHOD
5.1.6 Identify purposes of using decongestants in respiratory care.	6. Decongestants a. Action 1) Topical vasoconstrictor effect b. Patient application 1) Patients with upper airway congestion/obstruction (croup, epiglottitis) c. Adverse effects 1) Mild, generalized sympathetic response d. Contraindications 1) No specific contraindications	Lecture/discussion Handout
5.1.7 Explain how mucolytics and diluents are used in treating respiratory disorders.	7. Mucolytics a. Action 1) Breaks down mucus b. Patient application 1) Thick, viscus mucus 2) Decreased cough strength c. Adverse effects 1) Bronchospasm d. Contraindications 1) Used with caution with patients with hyperreactive airways 8. Diluents a. Action 1) Dilute drugs 2) Facilitate movement of fluid across alveolar membrane by use of osmotic pressure gradients b. Patient application 1) Additional hydration of lower bronchial tree is indicated	Lecture/discussion Handout

Unit V. This unit provides a review of basic respiratory care treatments.

Page 5

OBJECTIVE	CONTENT	METHOD
5.1.8 Identify the purpose of using antibiotics in respiratory treatment.	c. Adverse effects 1) Bronchospasm d. Contraindications 1) Patients prone to bronchospasm, use with caution	Lecture/discussion Handout
5.2 Review formula for calculating drug dosages.	9. Antibiotics a. Action 1) Topical application to infected area of lung b. Patient application 1) Suggested effective for all gram negative bacilli 2) RSV infection c. Adverse effects 1) Hypersensitivity to antibiotic 2) Use with caution with patients with renal dysfunction 3) Ribavirin should not be given to pregnant women d. Contraindications B. Dosage calculations 1. Most drugs in standard dose, already diluted to administration strength. Non-standard dosage may require calculation. 2. General principles a. Solute - agent to be dissolved b. Solvent - fluid in which agent is dissolved c. 1 gram (gm) = 1000 milligrams (mg) 1 liter (l) = 1000 milliliters (ml) 1 ml = 1 cc	Lecture Worksheets

Limited Respiratory Care

Unit V. This unit provides a review of basic respiratory care treatments.

Page 6

OBJECTIVE	CONTENT	METHOD
	d. 1:1000 means: 1) 1 mg solute in 1000 ml solvent 2) What does 1:200 mean? 3) what does 1:100 mean? e. 1% solution means: 1) 1 mg solute to 100 ml solvent 2) What is 0.1% solution? 3) What is a 10% solution? (1:100 solution = 1% solution)	
	3. Two step formula for calculating drug to be administered a. Calculate strength of drug on hand to derive mg/ml (concentration) $\frac{\text{Total mg}}{\text{Total ml}} = \text{mg/ml (concentration)}$ b. Divide mg desired by mg/ml to derive volume required $\frac{\text{Total mg desired}}{\text{mg/ml (concentration)}} = \text{ml required to deliver dose desired}$	
5.3 Discuss the overall goals of all aerosol therapy (HHN, MDI, USN).	C. Goals of aerosol therapy 1. Aid to bronchial hygiene 2. Means to humidify inspired gases 3. Means to deliver medication	Lecture/discussion
5.3.1 Demonstrate the use of the hand-held nebulizer (HHN).	D. Hand-held nebulizer 1. Nebulizer is an instrument used to generate aerosols (fine mist) utilizing Bernoulli effect. Delivers optimal particle size (0.3-5 microns) for good bronchial deposition 2. HHN's versatile with widespread usage/ adaptability to clinical setting	Demonstration

Unit V. This unit provides a review of basic respiratory care treatments.

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OBJECTIVE	CONTENT	METHOD
	3. Recommendations for use widespread. Excellent mode of delivery of broncho-dilator therapy from pediatric to adult patient population	
	4. Procedure for use	Demonstrations
	a. Complete procedure for proper hand-washing techniques	
	b. Obtain equipment and meds	
	c. Assemble equipment and insure it is in proper working order (a 50 cc extension should be added on end of t-piece to act as an aerosol reservoir)	
	d. Check label on medication and place in nebulizer cup	
	e. Check name band of patient in accordance with patient preparation and hospital policy	
	f. Utilize correct patient posture when applicable	
	1) Sit upright to insure optimal deposition of aerosol particles	
	g. Liter flow should be set at 5-7 ml checking to see that an adequate aerosol is being delivered	
	1) If patient is receiving supplemental O ₂ an attempt should be made to maintain the same F _I O ₂ throughout the treatment	
	2) Patients that are CO ₂ retainers should receive therapy via compressed air	
	h. Patient instruction	
	1) Breathe normally in and out through mouth piece	

Limited Respiratory Care

Unit V. This unit provides a review of basic respiratory care treatments.

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OBJECTIVE	CONTENT	METHOD
	2) Periodic breath hold enables good deposition of aerosol particles i. Pulse taken three times 1) Beginning of treatment 2) Middle of treatment 3) End of treatment 4) If pulse increases by 10-15 bpm (breaths per minute) or according to hospital policy, treatment should be stopped and reported to doctor j. Auscultation performed 1) Beginning of treatment 2) Middle of treatment 3) End of treatment 4) Changes in BS noted k. Monitor patient for adverse reactions and know procedure outlined by hospital in case of any adverse reaction l. Assists patient in proper controlled cough technique m. Disassembles equipment, dries it out and packages it for next treatment	
5.3.2 Demonstrate the use of the metered dose inhaler (MDI).	E. MDI - Metered Dose Inhaler 1. The MDI supplies a drug directly into the tracheobronchial tree through aerosolization of a drug. The liquid drug must be able to mix with air to form droplets which can be inhaled at alveolar level 2. Poor technique can lead to over-medication and possible increased systemic effects. If patient can taste medication, they have not effectively aerosolized the medication	Demonstration Return Demonstrations Skills checklist 5-1 "Metered Dose Inhaler"

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Limited Respiratory Care

Unit V. This unit provides a review of basic respiratory care treatments.

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OBJECTIVE	CONTENT	METHOD
	3. Technique difficult to coordinate for some patients	
	4. Therapy can be administered at home for convenience	
	5. Recommendations for use widespread from pediatric to adult patient population that require bronchodilator therapy.	
	Hazards can be:	
	a. Over-medicating	
	b. Self-diagnosing	
	6. Use of space extenders	Discussion
	7. Procedure for using MDI in clinical setting	
	a. Completes proper handwashing techniques	
	b. Obtain medication and check for correct patient name and drug dosages	
	c. Patient's name band should be checked according to patient preparation and hospital policy	
	d. Shake inhaler vigorously to mix contents	
	e. Hold inhaler firmly between forefinger and thumb	
	f. Slowly exhale as much air from the lungs as possible	
	g. Tilt head back to create a straighter airway. Place MDI with extendor between the lips being careful not to obstruct the spray with the teeth or the tongue and not to aim the spray on roof or sides of mouth	
	h. Start a slow, deep breath, squeeze inhaler to release medication (or have the spacer/extendor prefilled).	

Limited Respiratory Care

Unit V. This unit provides a review of basic respiratory care treatments.

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OBJECTIVE	CONTENT	METHOD
	Continue to inhale to a maximal inspiration	
	i. Hold breath for 2-5 seconds or for as long as possible	
	j. Exhale passively	
	8. Dosing recommendation	
	a. Wait at least 2-3 minutes between puffs	
	1) First puff dilates proximal airways	
	2) This allows second puff to penetrate deeper	
	b. Rinse mouth after steroids	
	c. Give steroids 30 minutes after the bronchodilator to allow further penetration	
	d. Stagger dosage times of drugs with similar actions, especially bronchodilators	
	e.g.: 0800-1200-1600-2000 first schedule 1000-1400-1800-2200 second schedule	
5.3.3 Demonstrate chest physiotherapy/ Postural Drainage.	F. CPT/PD	
	1. CPT is a series of manipulative techniques designed to prevent pulmonary complications and improve function in acute and chronic pulmonary disease	Demonstration Skills checklist 5-2 "Chest Physical Therapy"
	2. Goals of CPT	
	a. To prevent accumulation and improve mobilization of bronchial secretion	
	b. Improve efficiency and distribution of ventilation	
	c. Improve cardiopulmonary reserve using exercise techniques to promote physical conditioning	

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Unit V. This unit provides a review of basic respiratory care treatments.

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OBJECTIVE	CONTENT	METHOD
5.3.4 List precautions to take with postural drainage.	3. Postural Drainage (PD) a. Mucociliary escalator enhanced when aided by gravity 1) Mucus drainage of a lung segment is facilitated by body positions that allow mucus to flow in the direction of gravity b. Must possess firm knowledge of tracheobronchial anatomy 1) Upper lobes a) Apical segment b) Anterior segment c) Posterior segment d) Middle lobe 2) Lower lobes a) Superior (apical) segment b) Anterior basilar segment c) Posterior basilar segment d) Lateral basilar segment c. Basic positions for drainage of most common segments demanding postural drainage. If patient is confined to hospital bed, emphasis should usually be placed on following segments: 1) Posterior basilar segment 2) Middle lobe and lingula 3) Apical segments d. Precautions 1) Significant stress to cardiovascular system 2) Head down position may diminish venous return from the head and result in increased intracranial pressure	Handouts on patient positions of specific pulmonary segments

Limited Respiratory Care

Unit V. This unit provides a review of basic respiratory care treatments.

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OBJECTIVE	CONTENT	METHOD
	3) PD must not place stress on "healing" tissue, spinal fusions, or skin graft	
	4) Head down position increases risk of aspiration, particularly with neurologically impaired or tube fed patients	
	5) WEIGH THE BENEFIT VERSUS RISK!!	
	4. Check percussion/vibration	
	a. Completes proper handwashing techniques	
	b. Most often used in conjunction with postural drainage	
	c. Cup-shaped hands trapping air between hands and chest wall. Produces energy wave that is transmitted through chest wall lung tissue.	DEMONSTRATION
	d. This technique should loosen plugs and mobilize secretions via gravity and cough techniques	
	e. Performed rhythmically and alternately striking chest wall.	
	1) Bony prominences should be avoided	
	a) Clavicles	
	b) Spine	
	c) Scapula	
	2) Breast tissue should be avoided	
	f. Adjunct equipment for percussion	
	g. Contraindications to chest percussion	
	1) Hemorrhagic condition	
	2) Bony metastases "fragile" bones	
	3) Undrained emphysema	

Unit V. This unit provides a review of basic respiratory care treatments.

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OBJECTIVE	CONTENT	METHOD
5.3.5 Demonstrate vibration technique.	G. Vibration 1. By placing hands on chest wall can produce a very rapid vibrating motion. Done in conjunction with postural drainage and percussion 2. Performed during exhalation following a deep inspiration 3. Effective means of mobilizing secretions toward the gravity dependent major airways in conjunction with postural drainage and chest percussion H. Cough instruction 1. Controlled cough versus hacking uncontrolled cough 2. Mechanism of an effective cough is divided into 4 components a. Deep inspiration b. Epiglottis and vocal cords shut tightly to keep air in chest c. Contraction of abdominal muscles causes them to push against diaphragm d. Epiglottis and vocal cords open allowing air to exit as an expiratory blast thru mouth occurs 3. Controlled cough technique a. Inhale slowly, deep breath b. Exhale passively to the count of 4 c. Inhale slowly again d. Exhale (2 coughs) in succession as an aid to mobilize secretions 4. Abdominal binder on hand pressure a. Recommended in spinal cord injury or disease	Demonstration/Return Demonstration

Limited Respiratory Care

Unit V. This unit provides a review of basic respiratory care treatments.

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OBJECTIVE	CONTENT	METHOD
	I. Breathing efficiency 1. Normal inspiration accomplished by contraction of diaphragm 2. Stressed inspiration includes use of accessory muscles 3. When stress inspiration is recognized, breathing retraining may be indicated a. Segmental breathing/tactile sense may help assume a more appropriate breathing pattern b. Pursed lip breathing is beneficial for patient with obstructive disease J. Improving cardiopulmonary reserve 1. Accomplished through breathing retraining a. Diaphragmatic breathing b. Pursed lip breathing 2. Exercise conditioning 3. Mobilizing retained secretions	
5.3.6 Discuss the purposes of Incentive Spirometry.	K. Incentive Spirometry (I.S.) 1. Incentive Spirometry is a device that allows the patient to perform incentive spirometry without added resistance while presenting a visual quantitation of his/her effort 2. Goals of I.S. a. Optimize lung inflation b. Optimize cough mechanism c. Early detection of acute pulmonary disease 3. Criteria for I.S. a. Patient must be cooperative and motivated b. Lungs should be without pneumonia or obvious retained secretions	Lecture/discussion
122 5.3.7 List criteria for effective incentive spirometry.		123

Unit V. This unit provides a review of basic respiratory care treatments.

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OBJECTIVE	CONTENT	METHOD
5.3.8 Demonstrate the ability to administer incentive spirometry.	c. Respiration rate of < 25 bpm should be present (OPTIMALLY!) 4. Administration of I.S. a. Use proper handwashing techniques b. From a resting exhalation, patient should take a slow, maximal inspiration c. Inspiratory hold if possible d. Exhale passively e. Minimum of 10-20 breaths should be done with frequent rest intervals f. Proper goals should be set. They should be achieved! g. Assistance with controlled coughing should be offered 5. Main advantages of I.S. over IPPB as a prophylactic regimen are: a. More effective prophylactic technique b. Patient receives more frequent therapy c. Personnel time (and cost) is minimized d. Performance appears to dramatically decrease as acute pulmonary disease occurs	Demonstration/Return Demonstration Skills checklist 5-3 "Incentive Spirometry"
5.3.9 Discuss purposes and benefits of Ultrasonic Nebulizer (USN) therapy.	L. Ultrasonic Nebulizer (USN) 1. Definition a. Nebulizer that produces very dense mist with optimal particle size range (0.5-3 microns) for optimal aerosol deposition b. Contains power unit and nebulizing unit 1) Power unit - produces ultra high frequency electric current	Lecture/discussion Skills checklist 5-4 "Ultrasonic Nebulizer"

Limited Respiratory Care

Unit V. This unit provides a review of basic respiratory care treatments.

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OBJECTIVE	CONTENT	METHOD
5.3.10 List recommended uses for ultrasonic nebulizer.	2) Nebulizing unit a) Contains piezo electric transducer which transforms high frequency current into high frequency vibrations b) Fine-particle nebulization occurs in aerosol medication chamber entirely by acoustic energy without use of air or gas c) Aerosol particles are carried to patient by a blower 2. Recommendations for use a. Excellent source of humidity and bronchodilator therapy b. Patient population must be monitored closely c. Alternative mode of bronchodilators/ aerosol delivery may be necessary 3. Precautions a. Bronchospasm b. Over-hydration	
5.3.11 Demonstrate usage of U.S.N.	4. Demonstrate proficiency in use of USN in clinical setting by a. Use proper handwashing techniques b. Obtain proper equipment and test machine function c. Handwashing d. Patient's nameband should be checked in accordance with patient preparation e. Medication label should be checked before placing medication in the machine	Demonstration/Return Demonstration

Unit V. This unit provides a review of basic respiratory care treatments.

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OBJECTIVE	CONTENT	METHOD
	f. Plug USN in, turn power on and adjust frequency as necessary to provide fine mist g. Instruct patient to sit upright if possible for assistance in aerosol deposition h. Patient's pulse should be taken before, during and after the treatment i. Patient should be instructed to breathe normally with whatever apparatus he/she is using (facemask/facetents/mouthpiece) j. Monitor the patient for adverse reactions and know the proper procedure outlined in the procedure manual k. Patient should be instructed periodically to perform a breath hold for assistance in deposition of aerosol particles l. Assist the patient with proper controlled cough techniques after the treatment m. Disassembles the equipment, dries it out and packages it for the next treatment	
5.4 Discuss purposes of sputum induction therapy.	M. Sputum Induction Therapy	Lecture/discussion
	1. Means to obtain sputum sample for diagnostic purposes 2. Always attempt spontaneous sputum first 3. Adjunct equipment needed for sputum induction a. Hand Held Nebulizer (HHN) via compressed air or O₂ (refer to HHN competency)	
5.4.1 List adjunct equipment needed for sputum induction therapy.		

Limited Respiratory Care

Unit V. This unit provides a review of basic respiratory care treatments.

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OBJECTIVE	CONTENT	METHOD
5.4.2 List tests that can be done on sputum.	b. Can use USN if applicable to your institution (refer to USN competency) c. Use normal saline as diluent (.09%) (Hypertonic saline may be indicated) 1) If hypertonic saline (3%) is used, have bronchodilator on hand in case of bronchospasm 4. Attempt in AM before breakfast a. Good oral hygiene 5. Tests obtained for sputum evaluation a. Acid Fast Bacillus (AFB) (Usually 1 sample per day x 3 days) may need special fixative in sputum cup, verify with lab b. Cytology (usually 1 sample per day x 3 days) May need special fixative in sputum cup, verify with lab c. Gram stain d. Fungal e. Culture and sensitivity 6. Cough assistance may be indicated	

Limited Respiratory Care
Handout

Table 1
Sympathetic Bronchodilators

Generic Name	Brand Name	Action	Dose	Note
Isoproterenol	Isuprel	Beta ₁ & 2	0.5 ml. in 3-5 ml. diluent q. 4 hours	may be given as nebulizer or MDI
Isoetharine	Bronkosol	Beta ₂	0.5 ml. in 2 ml. diluent q. 4 hours	given with nebulizer
Terbutaline	Bricanyl Brethine Brethaire	Beta ₂	0.25 ml.	may be given by nebulizer, MDI, or subcutaneously
Albuterol	Proventil Ventolin	Beta ₂	0.5 ml.	may be given by MDI or nebulizer
Metaproterenol	Alupent Metaprel	Beta ₂	0.3 ml. q.i.d.	can be given by MDI or nebulizer

Limited Respiratory Care
Handout

Table 2
Anticholinergics and Xanthines

Generic Name	Brand Name	Action	Dose	Note
Atropine Sulfate or Inhalation	Day-Dose	anticholinergic	1 mg. - 2% solution q. 4 hours	given by nebulizer only
Ipratropium Bromide	Atrovent	anticholinergic	2 puffs q.i.d.	supplied in MDI only
Theophylline	Bronkodyl Slo-phyllin Theolair Theo-Dur Respid	xanthine	variable (maintain blood level of 10-20 mcg/ml)	given as oral or IV route
Aminophylline	Aminophylline	xanthine (79% theophylline)	variable (maintain blood level of 10-20 mcg/ml)	given as oral or IV route

Limited Respiratory Care
Handout

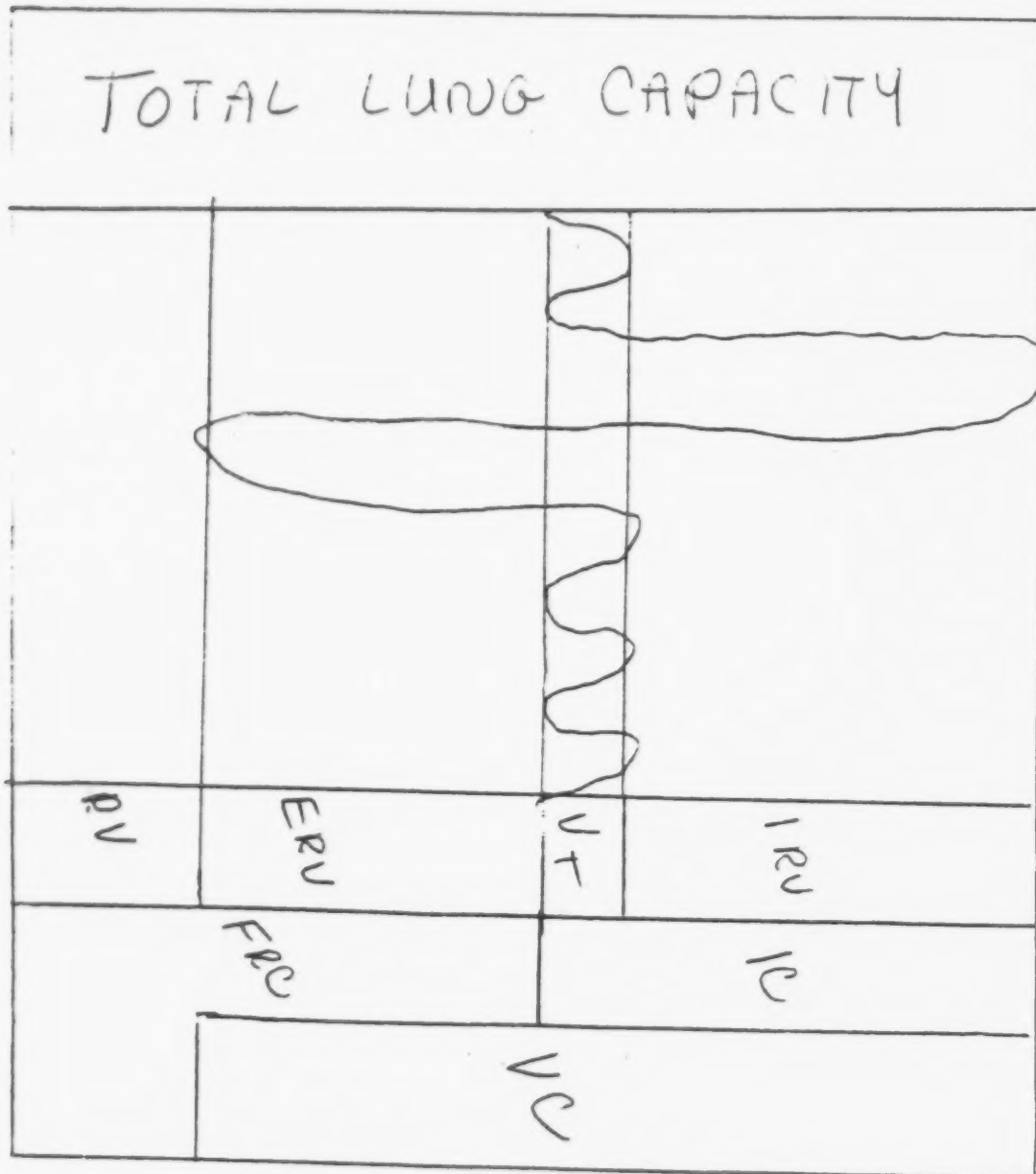
Table 3
Mucolytics, Decongestants, and Diluents

Generic Name	Brand Name	Action	Dose	Note
Actylcysteine	Mucomyst	breaks the disulfide bonds of mucus	10 ml. of 10% sol.; or 2.5 ml. of 20% sol. with 2.5 ml. diluent	given as nebulizer treatment
Racemic Epinephrine	MicroNefrin Vaponefrin	topical vasoconstriction (decongestant)	0.25-0.5 ml. q.i.d.	given as nebulizer treatment
Isotonic Normal Saline	0.9% Sodium Chloride for Injection	isotonic diluent	5 ml.	given as nebulizer treatment
Hypertonic Saline	3% or 5% Sodium Chloride for Injection	hypertonic diluent (attracts fluid from tissues)	3-10 ml.	given as nebulizer treatment

Limited Respiratory Care
Handout

Table 4
Corticosteroids and Antibiotics, and Mast Cell Inhibitors

Generic Name	Brand Name	Action	Dose	Note
Dexamethasone Sodium Phosphate	Decadron	steriod (anti-inflammatory)	0.5 ml. (inhalation) variable oral dose	inhalation or oral route
Beclomethasone dipropionate	Vanceril	steriod (anti-inflammatory)	2 puffs q.i.d.	best when given shortly after broncodilator. Available as MDI only
Polymyxin B Sulfate	Polymyxin B	antibiotic	5 ml. q.i.d.	given as nebulizer treatment
Ribavirin	Virazole	antibiotic	55 mg/hr.	worn as nebulizer and mask, used for special cases only
Cromalyn Sodium	Intal	blocks antigen response at the mast cell	2 puffs q.i.d.	available as MDI, or as a powder for inhalation (rarely used)



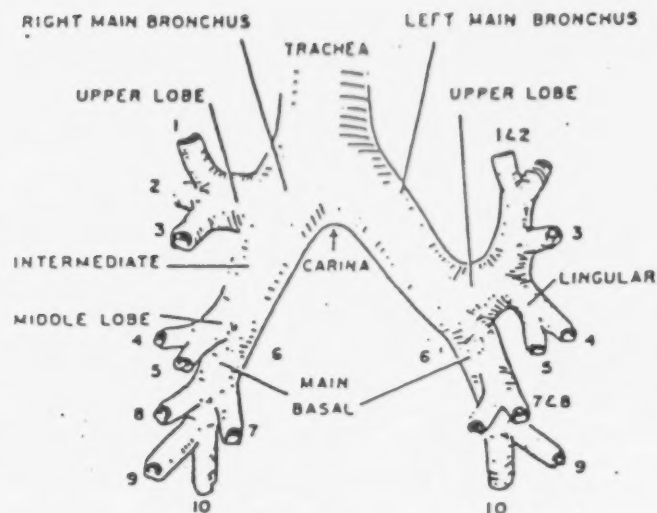
INDICATE SPIROGRAM

Limited Respiratory Care

Definitions

Normals

3500 ml	IC	Incentive Capacity Maximal volume of gas that can be inhaled from the resting expiratory position after a normal exhalation
1000 ml	ERV	Expiratory Reserve Volume Maximal volume of gas that can be exhaled following normal resting expiration
6000 ml	TLC	Total Lung Capacity Sum of vital capacity and residual volume and it is defined as volume of gas contained in the lungs at the end of a maximal inspiration
1500 ml	RV	Residual Volume Volume of gas remaining in lungs after a forced exhalation. Since it cannot be expelled by expiratory effort, it is the only volume that cannot be measured directly from the spirometer
2500 ml	FRC	Functional Residual Capacity Volume of gas contained in the lungs at the end of a normal quiet expiration and is the sum of the ERV and RV

RIGHT LUNG

UPPER LOBE (RUL)

1. APICAL
2. POSTERIOR
3. ANTERIOR

MIDDLE LOBE (RML)

4. LATERAL
5. MEDIAL

LOWER LOBE (RLL)

6. SUPERIOR APICAL
7. MEDIAL BASAL
8. ANTERIOR BASAL
9. LATERAL BASAL
10. POSTERIOR BASAL

LEFT LUNG

UPPER LOBE (LUL)

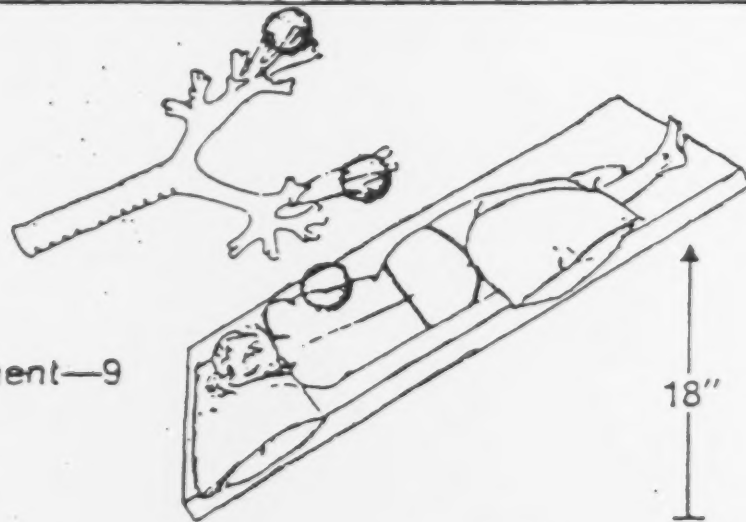
1. & 2. APICOPosterior
3. ANTERIOR
4. SUPERIOR LINGULAR
5. INFERIOR LINGULAR

LOWER LOBE (LLL)

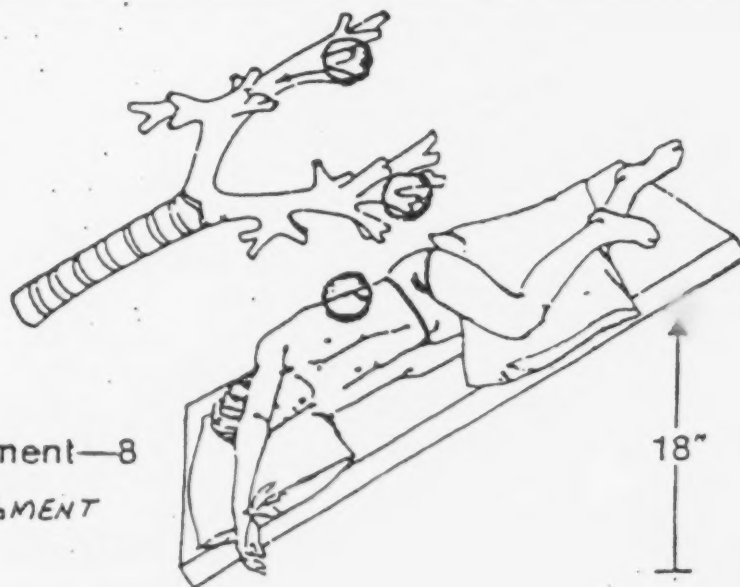
6. SUPERIOR APICAL
7. & 8. ANTERIOR BASAL
9. LATERAL BASAL
10. POSTERIOR BASAL

Foot of table or bed elevated 18 inches or 30 degrees. Patient lies on abdomen, then rotates $\frac{1}{4}$ turn upward. Upper leg can be flexed over a pillow for support. (Clap over uppermost portion of lower ribs.)

LOWER LOBES
Lateral Basal Segment—9

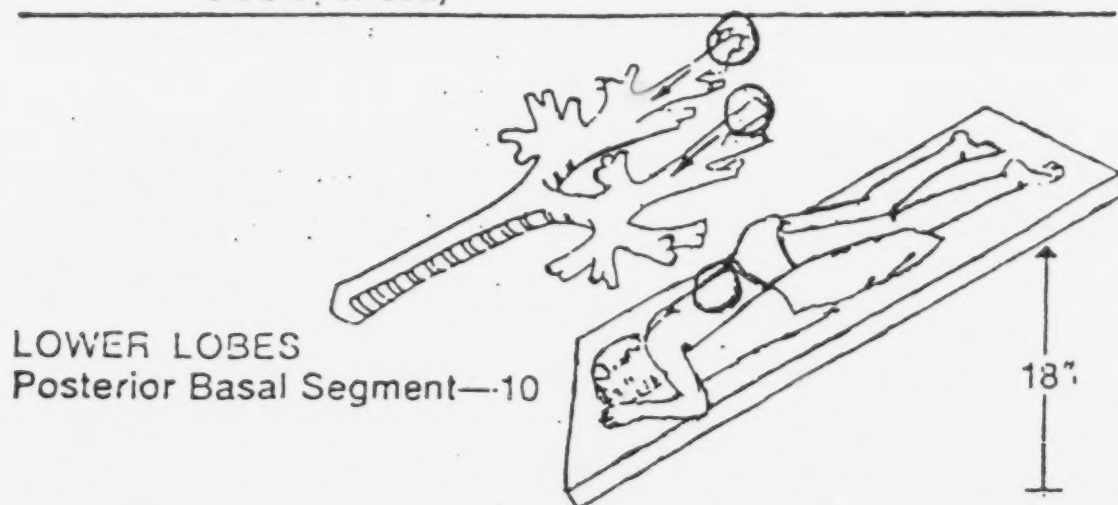


Foot of table or bed elevated 18 inches or 30 degrees. Patient lies on side, head down, pillow under knees. (Clap over lower ribs just beneath axilla.)



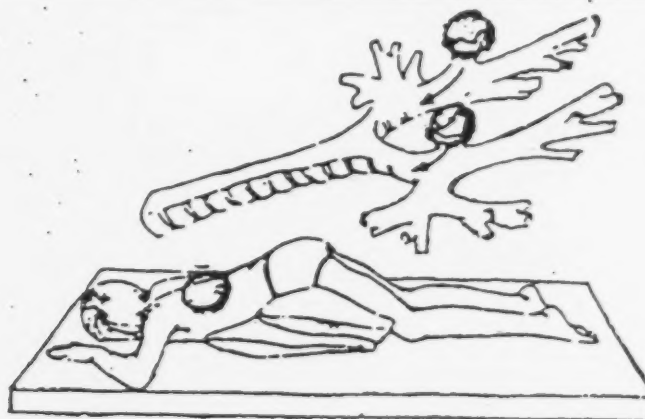
LOWER LOBES
Anterior Basal Segment—8
MEDIAL BASAL SEGMENT
(RLL) — 7

Foot of table or bed elevated 18 inches or 30 degrees. Patient lies on abdomen, head down, with pillow under hips. Upper leg can be flexed over a pillow for support. (Clap over lower ribs close to spine on each side of chest.)



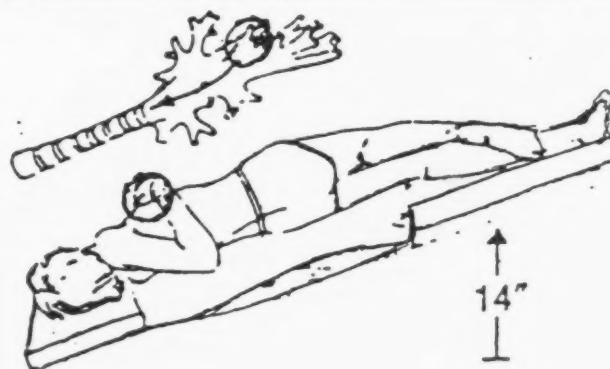
Bed or table flat. Patient lies on abdomen
with pillows under hips. (Clap over middle
of back below tip of scapula on either side
of spine.)

LOWER LOBES
Superior Segment—6



Foot of table or bed elevated 14 inches or about 15 degrees. Patient lies head down on left side and rotates $\frac{1}{4}$ turn backward. Pillow may be placed behind patient from shoulder to hip. Knees should be flexed. (Clap over right nipple area.)

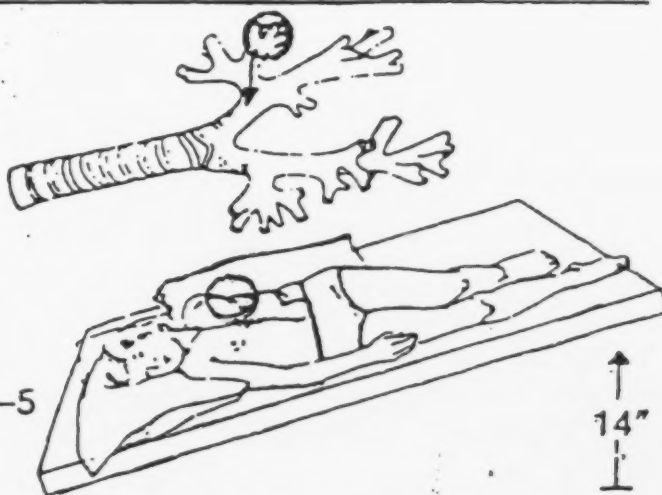
RIGHT MIDDLE LOBE
Lateral Segment—4
Medial Segment—5



Foot of table or bed elevated 14 inches or about 15 degrees. Patient lies head down on right side and rotates $\frac{1}{4}$ turn backward. Pillow may be placed behind patient from shoulder to hip. Knees should be flexed. (Clap over left nipple area.)

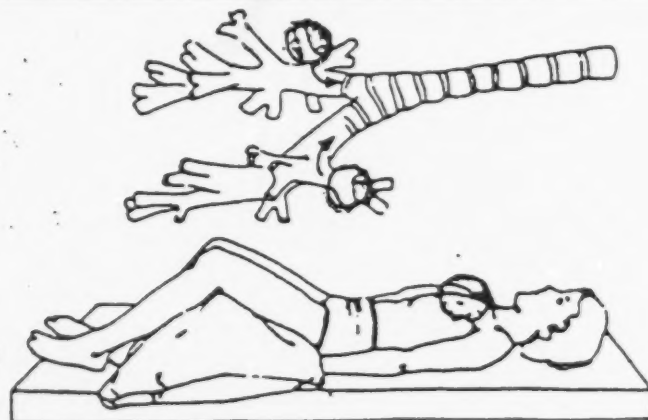
LEFT UPPER LOBE
Lingular Segment
Superior—4 Inferior—5

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Bed or drainage table flat. Patient lies flat on back with pillow under knees. (Clap between clavicle and nipple on each side of chest.)

UPPER LOBES
Anterior Segment—■ 3



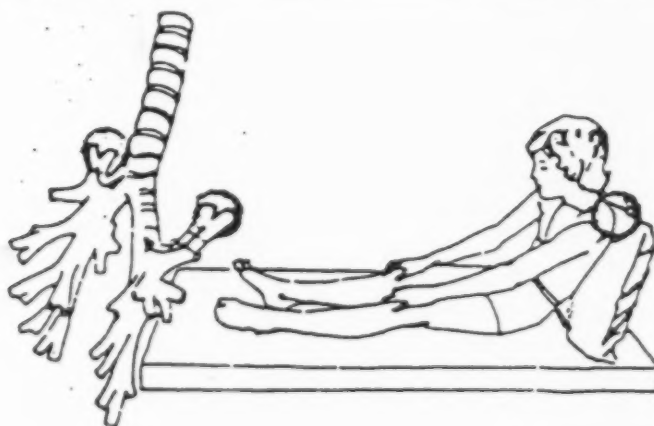
Bed or drainage table flat. Patient leans
over folded pillow at 30 degree angle.
(Clap over upper back on each side of
chest.)

UPPER LOBES
Posterior Segment—■ 2



Bed or drainage table flat. Patient leans back on pillow at 30 degree angle. (Clap over area between clavicle and top of scapula on each side.)

UPPER LOBES
Apical Segment—1



Limited Respiratory Care

Skills Checklist 5-1 METERED DOSE INHALER (MDI)

Introduction

To receive optimal effect from mistometer therapy the patient must be very well coordinated. In the patient cannot give him/herself a proper treatment after three days of education, he/she may need to be changed to another form of therapy.

Procedure

Lab

Clinical

I. Prepares for Treatment:

- | | | | |
|---|-------|-------|-------|
| A. Completes procedure for chart review | _____ | _____ | _____ |
| B. Completes procedure for handwashing techniques | _____ | _____ | _____ |
| C. Completes procedure for patient preparation | _____ | _____ | _____ |

II. Implements Procedure:

- | | | | |
|--|-------|-------|-------|
| A. Obtains medication | _____ | _____ | _____ |
| B. Label on the medication should be checked three times for correct patient name and drug dosage: | | | |
| 1. When removing the med from the refrigerator or medication cart | _____ | _____ | _____ |
| 2. When entering a patient's room or removing medication cart | _____ | _____ | _____ |
| 3. Immediately before administering medication to the patient | _____ | _____ | _____ |
| C. Patient's name band should be checked according to patient preparations | _____ | _____ | _____ |
| D. Shakes the MDI well before using | _____ | _____ | _____ |
| E. Removes the cap from the MDI and makes sure the mistometer is put together properly | _____ | _____ | _____ |
| F. Instructs the patient to: | | | |
| 1. Exhale all the air in his/her lungs | _____ | _____ | _____ |
| 2. Open his/her mouth wide | _____ | _____ | _____ |
| 3. Hold the MDI 1" to 1 1/2" away from his/her mouth. (The optimal deposition comes from the "cone" effect of the medication. If possible, an extender or spacer should be used) | _____ | _____ | _____ |
| 4. Inhale deeply through his/her mouth | _____ | _____ | _____ |
| 5. On inspiration, fully depress the top of the canister with the index finger | _____ | _____ | _____ |
| 6. Hold the breath as long as possible | _____ | _____ | _____ |
| 7. Demonstrate the procedure if it appears the patient does not comprehend | _____ | _____ | _____ |
| G. Assists the patient with short verbal commands as he/she does the procedure him/herself | _____ | _____ | _____ |
| H. If the patient is unable to do the procedure, assists him/her in doing it. Continues to reeducate the patient each time therapy is given | _____ | _____ | _____ |

Limited Respiratory Care

Skills Checklist 5-1 (continued)

<u>Procedure</u>	<u>Lab</u>	<u>Clinical</u>
I. If the dosage is two puffs, waits two to five minutes before giving the next puff	___	___
J. If the bronchodilator and steroids are to be given, gives the bronchodilator first and then the steroid dosage	___	___
K. Has the patient rinse his/her mouth if possible	___	___
III. Completes Procedure:		
A. Completes procedure for auscultation	___	___
B. Completes procedure for discontinuing therapy	___	___

Pass/Fail _____ Date _____

Proctor/Instructor's Initials _____ Clinical Site _____

Limited Respiratory Care
Skills Checklist 5-2
CHEST PHYSICAL THERAPY (CPT)

Introduction

Postural drainage and percussion are classified as methods to help remove secretions from the lungs. These methods should be used with patients who have large amounts of secretions and a difficult time removing them. Before attempting chest physical therapy, proper assessment of the area of involvement is necessary.

Procedure

Lab Clinical

- | | | | |
|--|-------|-------|-------|
| I. Prepares for Treatment: | | | |
| A. Completes procedure for chart review | _____ | _____ | _____ |
| B. Completes procedure for handwashing technique | _____ | _____ | _____ |
| C. Completes procedure for patient preparation | _____ | _____ | _____ |
| D. Completes procedure for auscultations | _____ | _____ | _____ |
| E. Completes procedure for percussion | _____ | _____ | _____ |
| II. Implements Procedure: | | | |
| A. Positions patient correctly and comfortably and identifies the lung segment being drained | _____ | _____ | _____ |
| B. Cups hands appropriately. Wrists and arms are loose | _____ | _____ | _____ |
| C. Acceptable rate, rhythm and striking force are applied | _____ | _____ | _____ |
| D. Proper body mechanics and position are used (Bed is the right height, patient is close enough to technician) | _____ | _____ | _____ |
| E. Identifies the four areas to be avoided (xiphoid, spine, kidney areas, breast tissue) | _____ | _____ | _____ |
| F. Correctly performs vibration during the expiratory phase after each period of clapping | _____ | _____ | _____ |
| G. Percusses in all positions indicated | _____ | _____ | _____ |
| H. Instructs patient in the proper coughing and deep breathing techniques after each segment | _____ | _____ | _____ |
| I. Turns and positions patient with minimal discomfort to the patient | _____ | _____ | _____ |
| J. Drainage and percussion should be done for a minimum of 5 to 10 minutes <u>for each segment</u> (This depends on patient tolerance) | _____ | _____ | _____ |
| K. Periodically checks patient for discomfort, color, breathing rate and pattern | _____ | _____ | _____ |
| III. Completes Therapy | | | |
| A. Completes procedure for auscultation | _____ | _____ | _____ |
| B. Completes procedure for discontinuing therapy | _____ | _____ | _____ |

Pass/Fail _____ Date _____

Proctor/Instructor's Initials _____ Clinical Site _____

Limited Respiratory Care

Skills Checklist 5-3 INCENTIVE SPIROMETRY (I.S.)

Introduction

Incentive spirometry is a treatment modality that is used to encourage patients to take deep, slow inhalations; thereby keeping their lungs well expanded. It is an inexpensive device, easy to use and may be used throughout the day by the patient. The patient should be monitored to see that he/she is using it often and has the proper technique.

Procedure

Lab

Clinical

I. Prepares for Treatment:

- | | | | |
|--|-------|-------|-------|
| A. Completes procedure for chart review | _____ | _____ | _____ |
| B. Completes procedure for handwashing technique | _____ | _____ | _____ |
| C. Completes procedure for patient preparation | _____ | _____ | _____ |
| D. Completes procedure for gross assessment | _____ | _____ | _____ |
| E. Completes procedure for auscultation | _____ | _____ | _____ |

II. Implements Procedures:

- | | | | |
|---|-------|-------|-------|
| A. Instructs the patient that, from a resting exhalation, he/she takes a slow maximal inhalation (if volumetric spirometers are used, the yellow float in the righthand chamber should not move above the clear indicator line) | _____ | _____ | _____ |
| B. Instructs the patient to do an inspiratory hold | _____ | _____ | _____ |
| C. A minimum of 15-25 deep breaths should be done with frequent rest periods | _____ | _____ | _____ |
| D. Proper goals or volumes should be set. The goals must give the patient something to strive for, but should also be achievable | _____ | _____ | _____ |
| E. The patient, his/her family or his/her nurse should be instructed to work with the modality as often as necessary | _____ | _____ | _____ |
| F. The student should instruct the patient on proper cough techniques and assist in good controlled coughing | _____ | _____ | _____ |

III. Completes Therapy:

- | | | | |
|--|-------|-------|-------|
| A. Completes procedure for auscultation | _____ | _____ | _____ |
| B. Completes procedure for discontinuing therapy | _____ | _____ | _____ |

Pass/Fail _____ Date _____

Proctor/Instructor's Initials _____ Clinical Site _____

Limited Respiratory Care
Skills Checklist 5-4
ULTRASONIC NEBULIZER THERAPY (USN)

Introduction

Ultrasonic therapy is a means of supplying humidity or medication to the patient's airways. Proper deposition, penetration, retention, and clearance are essential. Effectiveness can only be achieved if proper techniques are employed.

Procedure

Lab

Clinical

I. Prepares for Treatment:

- | | | | |
|--|-------|-------|-------|
| A. Completes procedure for chart review | _____ | _____ | _____ |
| B. Completes procedure for handwashing technique | _____ | _____ | _____ |
| C. Completes procedure for patient preparation | _____ | _____ | _____ |
| D. Completes procedure for auscultation | _____ | _____ | _____ |

II. Implements the Procedure

- | | | | |
|---|-------|-------|-------|
| A. Obtains the proper equipment and tests machine function | _____ | _____ | _____ |
| B. Plugs ultrasonic nebulizer in. Turns on the power and adjusts the frequency as necessary to produce a fine mist | _____ | _____ | _____ |
| C. Instructs the patient to sit upright if possible. The optimal position for gravity to assist with aerosol deposition is with the patient sitting upright | _____ | _____ | _____ |
| D. The patient's name band should be checked in accordance with patient preparation | _____ | _____ | _____ |
| E. The medication label should be checked before placing the medication in the machine | _____ | _____ | _____ |
| F. The patient's pulse should be taken at the beginning of therapy, in the middle and at the end of the treatment | _____ | _____ | _____ |
| G. Instructs the patient to breathe normally with whatever apparatus he/she is using (face mask, face tent, or mouthpiece) | _____ | _____ | _____ |
| H. Monitors the patient for adverse reactions and knows the proper procedures outlined in the procedure manual in case a patient has an adverse reaction | _____ | _____ | _____ |
| I. The patient should be instructed periodically to hold his/her breath (this will improve deposition of aerosol particles) | _____ | _____ | _____ |
| J. Disassembles the equipment, dries it out and packages it for the next treatment | _____ | _____ | _____ |

III. Completes Procedure

- | | | | |
|---|-------|-------|-------|
| A. Completes procedure for auscultation | _____ | _____ | _____ |
| B. Completes procedure for palpation | _____ | _____ | _____ |

Limited Respiratory Care
Skills Checklist 5-4 (continued)

<u>Procedure</u>	<u>Lab</u>	<u>Clinical</u>
C. Completes procedure for gross assessment	___	___
D. Completes procedure for discontinuing therapy	___	___

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Unit VI. This unit deals with use of airways.

Time: 4-6 hours

OBJECTIVE	CONTENT	METHOD
6.0 Using information provided by the respiratory therapy department identify through appropriate clinical assessment the needs of airway maintenance.	I. Airways	Lecture/discussion
	A. Identification of appropriate airways	
	1. Nasal airway	Demonstration/Return
	a. Uncuffed rubber/plastic tubes	Demonstration
	b. Inserted through noses, must be well lubricated	Checklist
6.0.1 Describe types of nasal airways and list indications for use.	c. Indications for use:	
	1) Facilitate clearance of secretions	
	2) Minimize trauma of frequent naso-tracheal suctioning	
	3) When insertion of oropharyngeal airway is difficult or impossible or patient is conscious	
6.0.2 Select the appropriate airway size and identify precautions in selecting size.	d. Size recommendations	Lecture/discussion
	1) Large adult - 8-9 mm ID	
	2) Medium adult - 7-8 mm ID	
	3) Small adult - 6-7 mm ID	
	4) Pediatric	
	E. Precautions	
	1) If tube is too long it may enter the esophagus	
	2) May cause nasal bleeding during insertion	
6.1 List characteristics of oropharyngeal airways and describe insertion.	2. Oropharyngeal airways	Demonstration/Return
	a. Semi-circular shaped device that when in proper position will hold tongue away from posterior pharynx	Demonstration
	b. Inserted upside down and rotated into proper position in an unconscious patient	Checklist
6.1.1 Determine which patients would benefit from oropharyngeal airways.	c. Indications for use	Lecture/discussion
	1) Unconscious patients only	
	2) Maintain patent airway	

Limited Respiratory Care

Unit VI. This unit deals with use of airways.

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OBJECTIVE	CONTENT	METHOD
6.1.2 Select appropriate size of oropharyngeal airway.	d. Size recommendations 1) Large adult - 100 mm (size 5) 2) Medium adult - 90 mm (size 4) 3) Small adult - 80 mm (size 3) 4) Pediatric	Display/Demonstration
6.1.3 List precautions for inserting oropharyngeal airways.	e. Precautions 1) Improper assertion may occlude airway 2) If airway is too long it may press epiglottis against larynx causing complete airway obstruction 3) May cause vomiting	Lecture/discussion
6.2 Discuss the use of endotracheal tubes.	3. Endotracheal tubes a. Long cuffed tube which is inserted into trachea. With cuff inflated it allows for a closed system b. Inserted into trachea via oral or nasal route	Lecture/discussion
6.2.1 Review indications for endotracheal.	c. Indications for use 1) Inability to ventilate with conventional methods 2) Inability of patient to protect airway 3) Need for prolonged artificial ventilation	Lecture/discussion
6.2.2 Identify appropriate sizes.	d. Size recommendations 1) Female - 7-8 mm ID 2) Male - 8-8.5 mm ID 3) Pediatric	
6.2.3 Care for patients with endotracheal tubes.	e. Complications 1) Insertion requires individual who is familiar with technique and legally permitted to perform it	Lecture/discussion Demonstration/Return Demonstration

Unit VI. This unit deals with use of airways.

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OBJECTIVE	CONTENT	METHOD
	2) Insertion too far may occlude left main stem bronchus	
	3) Improper insertion into esophagus will cause complete airway obstruction and anoxia	
	4) Prolonged over inflation of the cuff will cause tracheal wall ischemia and damage	
	5) Bypass humidification/filtration system. Need humidification	
6.3 Review the use of tracheostomy.	4. Tracheostomy tubes	Lecture/discussion
	a. Short, hollow, cuffed tube surgically inserted into trachea	
	b. Surgically inserted into the trachea below the level of the larynx	
6.3.1 Review indications for use of tracheostomy.	c. Indications - Same as endotracheal plus	Lecture/discussion
	1) Conditions which make upper airway inaccessible	
	2) Facilitation for removal of secretions	
6.3.2 Care for patient with a tracheostomy.	d. Complications	Lecture/discussion
	1) Post insertion hemorrhage	
	2) Requires good hygiene/frequent cleaning to prevent infection	
	3) Bypass humidification/filtration system. Needs humidification	
	4) Prolonged over inflation can cause tracheal wall ischemia and necrosis	
6.3.3 List various modifications that can be made to tracheostomies.	e. Modifications of tracheotomy tube	Display of devices
	1) Non-cuffed (Jackson) trach tube	
	2) Fenestrated Trach Tube	
	3) Bivona Trach Tube	
	4) Speaking Trach Tube	

Limited Respiratory Care

Unit VI. This unit deals with use of airways.

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OBJECTIVE	CONTENT	METHOD
6.4 Demonstrate the correct procedure for suctioning a patient's oropharynx.	B. Suctioning Oropharynx 1. Perform patient preparation and clinical assessment 2. Position patient head up if possible 3. Handwashing/CDC precaution (gloves) 4. Set up manual resuscitation with mask 5. Hyperinflate and hyperoxygenate patient (if deemed clinically necessary) 6. Suction patient's oropharynx taking care to avoid illiciting patient's gag reflex 7. Hyperinflate and hyperoxygenate patient between each attempt 8. Watch patient for arrhythmias, adverse reactions and discomfort 9. Adjunct equipment a. Yankour tip tube 1) Used for oropharynx 2) Patient can use independently	Demonstration/Return Demonstration Skills checklist 6-1 "Suctioning"
6.4.1 Describe the use of Yankour tip tube.		Lecture/discussion
6.4.2 Demonstrate procedure for correctly suctioning a patient with an endotracheal tube.	C. Suctioning an endotracheal or trach tube patient 1. Perform patient preparation and clinical assessment 2. Assemble equipment and set vacuum at appropriate setting (80-100 mmHg) 3. Handwashing/CDC precautions (gloves) 4. Set up manual resuscitator and assure that mask is on hand 5. Hyperinflate and hyperoxygenate patient 6. Suction patient endotracheally or trach tube for no more than 10 seconds SUCTION ONLY WHILE REMOVING CATHETER	

Unit VI. This unit deals with use of airways.

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OBJECTIVE	CONTENT	METHOD
	7. Hyperinflate and hyperoxygenate patient between each attempt 8. Instill 3-5 ccs normal saline between suction attempts if needed for tenacious sputum 9. Watch patient for arrhythmias, adverse reactions and discomfort 10. Maintain sterile technique throughout the procedure 11. Suction oropharynx only after completion of sterile technique	
6.5 Discuss the correct procedure for using resuscitation equipment.	D. Resuscitation equipment	Lecture/discussion
6.5.1 List recommended criteria for resuscitation equipment	1. Resuscitation equipment recommended criteria a. Self inflating bag easily cleaned and sterilized b. Non-jam valve system at 15 liters of oxygen flow c. No pressure relief or pop-off valve (or a means to manually bypass it when needed) d. Standard 15mm/22mm fittings e. Capable of delivery of high concentrations of oxygen with a capacity of 2-3 liters per adult; 500-700 ccs for pediatric f. True nonrebreathing valve g. Satisfactory performance under extremes of temperature h. Available in adult and pediatric sizes	
6.5.2 Demonstrate the operation of resuscitation equipment.	2. Technique a. Assuming the equipment is assembled turn oxygen flow on 15 L/m	Demonstration/Return Demonstration

Limited Respiratory Care

Unit VI. This unit deals with use of airways.

Page 6

OBJECTIVE	CONTENT	METHOD
	b. If mask is necessary, place mask over patient's nose and mouth maintaining a proper seal with head/neck hyper-extended c. Attach to artificial airway if mask is not required d. Compress bag and observe chest for hyperinflation e. Resuscitate (ventilate) patient at the desired rate	
6.6 Achieve CPR certification or recertification.	E. Maintain CPR certification/recertification annually per Red Cross or American Heart Association standards.	
6.7 Evaluate and document the effectiveness of all modes of respiratory therapy provided.	F. Evaluation of effectiveness of respiratory therapy provided 1. Assess overall patient condition a. Tracking/trending of breath sounds b. Sputum production improvement/cough effectiveness c. Evaluation of oxygenation status d. Stable hemodynamics (HR, BP) e. Subjective analysis of dyspnea status f. Activity tolerance 2. Review laboratory data pertinent to case	

Limited Respiratory Care

Skills Checklist 6-1

SUCTIONING

Introduction

Suctioning is the removal of secretion from the patient's airway by artificial means. It is an invasive technique that should only be done when appropriate. If suctioning is not done properly, it can cause physiological and psychological trauma to the patient. Review hazards and procedure for suctioning often.

Procedure

Lab

Clinical

I. Prepares for Treatment:

- A. Completes procedure for chart review
- B. Completes procedure for handwashing/gloving
- C. Completes procedure for patient preparation
- D. Completes procedure for auscultation when appropriate

_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

II. Endotracheal or Tracheostomy Suctioning of the Lower Airway:

- A. Positions the patient head up if possible
- B. Assembles equipment and sets vacuum at appropriate setting
- C. Sets up manual resuscitator and assures that mask is on hand (100% resuscitator bag is preferable)
- D. Hyperinflates and hyperoxygenates the patient with the resuscitator bag for at least 2 to 3 minutes prior to suctioning if possible
- E. Instills 3 to 5 cc's of saline if needed
- F. Suctions the patient's endotracheal or trach tube for no more than 10 seconds
- G. Hyperinflates and hyperoxygenates the patient between each suctioning attempt
- H. Watches the patient for arrhythmias, adverse reactions and discomfort during procedure

_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

III. Completes Procedure:

- A. Reassures patient and remains with him/her for several minutes after procedure
- B. Completes procedure for discontinuing therapy
- C. Completes ventilator check if necessary

_____	_____	_____
_____	_____	_____
_____	_____	_____

Pass/Fail _____ Date _____

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Limited Respiratory Care

Unit VII. Utilize community resources in planning respiratory care for the patient.

Time: 1 hour

OBJECTIVE	CONTENT	METHOD
7.0 Utilize community resources in planning respiratory care for the patient upon discharge.	I. Community resources	Lecture/discussion
7.1 Plan for the patient's discharge.	A. Discharge planning	
	1. Assessment of the Home Going Needs	
	a. Environmental factors (home setting)	Skills checklist 7-1
	1) Steps	"Breathing Retraining"
	2) Availability of food	
	3) Availability of bathroom facilities	
	4) Resources for assistance in emergencies (family, neighbors, EMS)	
	5) Transportation	
	6) Self-care ability	
7.2 Assess patient's ability to maintain respiratory care.	2. Assessment of patient's ability to meet needs	
	a. Physical ability	
	b. Knowledge for compliance	
	c. Motivation	
	d. Financial ability	
7.3 Make appropriate referrals.	3. Referral/resources available for assistance	
	a. Family members/neighbors	
	b. Church organizations/volunteers	
	c. Community visiting nurses	
	d. Home health agencies	
	e. Hospital based programs	
	1) Respite care	
	2) First alert phone systems	
	f. Community services	
	1) Transportation	
	2) Mobile meals	
	g. Social Service	

Limited Respiratory Care

Skills Checklist 7-1 BREATHING RETRAINING

Introduction

Breathing retraining is done to help the patient learn again how to use the proper muscles of respiration. It also helps the patient concentrate on his/her breathing and may help to slow and relax him/her during times of shortness of breath. This technique is especially helpful in the rehabilitation of people with chronic obstructive lung disease.

Procedure

Lab

Clinical

I. Prepares for Treatment:

- | | | | |
|--|-------|-------|-------|
| A. Completes procedure for chart review | _____ | _____ | _____ |
| B. Completes procedure for handwashing technique | _____ | _____ | _____ |
| C. Completes procedure for patient preparation | _____ | _____ | _____ |
| D. Completes procedure for gross assessment | _____ | _____ | _____ |

II. Implements Procedures:

- | | | | |
|---|-------|-------|-------|
| A. Emphasizes that the patient is relaxed with good rapport between technician and patient | _____ | _____ | _____ |
| B. Instructs the patient to breathe in through his/her nose and out through pursed lips if possible | _____ | _____ | _____ |
| C. Demonstrates sequence of proper breathing to the patient: | _____ | _____ | _____ |
| 1. Inhalation--stomach comes out against hand | _____ | _____ | _____ |
| 2. Exhalation--stomach moves in. Exhalation is at least twice as long as inhalation | _____ | _____ | _____ |
| 3. Upper chest movement is minimal | _____ | _____ | _____ |
| 4. Emphasizes reasons for diaphragmatic breathing | _____ | _____ | _____ |
| D. The student places his/her hands at the costophrenic angle or on the patient's abdomen. The patient is instructed to breathe normally. The student gently squeezes down and inward during exhalation | _____ | _____ | _____ |
| E. After several respiratory cycles, as exhalation ends, the student instructs the patient to push out against his/her hand as the patient inhales. Maintains a slight pressure so that the patient has to push against the hand. | _____ | _____ | _____ |
| F. The sequence is repeated, with rest periods if necessary. Encouragement and short commands are given often | _____ | _____ | _____ |
| G. Once the patient "feels" the proper breathing, he/she can be instructed to breathe with his/her own hand and the technician's hand on the top to help him/her feel the rhythm and sequence | _____ | _____ | _____ |

Limited Respiratory Care
Skills Checklist 7-1 (continued)

Procedure

Lab

Clinical

III. Completes Procedure:

- | | | | |
|--|-----|-----|-----|
| A. Completes procedure for auscultation | ___ | ___ | ___ |
| B. Completes procedure for palpation | ___ | ___ | ___ |
| C. Completes procedure for discontinuing therapy | ___ | ___ | ___ |

Pass/Fail _____ Date _____

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